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THE FOUNDRY TRADE JOURNAL IS THE OFFICIAL ORGAN OF THE INSTITUTE OF BRITISH FOUNDRYMEN; THE WELSH ENGINEERS' AND FOUNDERS' ASSOCIATION, AND THE FOUNDRY TRADES EQUIPMENT AND SUPPLIES ASSOCIATION.

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What of the Future?

A change which has been insensibly modifying the engineering industry of Europe and which will in the aggregate have an enormous bearing on founding has hardly received the attention it deserves from foundrymen. We refer to the gradual supersession of the steam-driven by the motor-driven ship. The maritime supremacy of Britain was founded in the early days of the sailing ship by the ability and enterprise of her navigators. But it was sealed by the invention of the steam-engine and later of the turbine, and their application to marine practice, and no one, be he expert or amateur, can visit the new Science Museum at South Kensington without being impressed by the remarkable models of old and modern reciprocating and marine engines and turbines there shown.

For some years past the condition of British shipbuilding and its related engine-building has been indubitably parlous. During such a time as this, skilled men tend to leave the trade or to emigrate, managers and designers are discouraged by the lack of stimulus, and little money is available for actual development work. Consequently the trade tends to lack those financial resources and that reserve of brain-power which alone can successfully negotiate such a revolutionary change as that from steam to oil-engine construction. Yet that revolution is taking place, and with remarkable speed. At the present moment there are welcome signs of a shipbuilding revival, and the trade may be regarded as working to nearly three-fourths of its pre-war capacity, although it does not, of course, follow that this figure holds for any particular yard. The remarkable feature about present construction, however, is that nearly one-half of the total ships under construction in the yards of this country are to be motor-driven. Furthermore, 60 per cent. of the tonnage being built abroad consists of motor-driven vessels. What is more, the average size of the motor-driven ship under construction is larger than that of the steam-driven ship.

The motor-driven ship provides a bigger percentage of the tonnage under construction abroad than of that in this country, because, while the steam-engine and turbine are essentially British inventions, the heavy oil-engine came in the first place from Germany, and as a result the Continental engineer had a commanding lead in development at a critical early stage. To their cost many British manufacturers have since found this out.

The moral is primarily one for shipbuilders to draw, but there is a lesson for the founder in it as well. Some of the older reciprocating engine builders whose products were known all over the world have already been forced out of business or have been compelled to adapt themselves in other ways. From the foundry point of view, the modern internal combustion engine is a far more difficult proposition than any reciprocating engine or turbine. The thicknesses of metal employed are greater, in view of the explosive pressures created, the influence of cooling is more difficult to determine, and the problems of corrosion, lubrication and exhaust temperatures are considerable. From the metallurgical point of view also this type is much more difficult to make successfully, and the battle is likely to go not so much to the strong as to the wise, and the wise are those who look ahead, and who, putting themselves in touch with the results of modern metallurgical research, endeavour to build up a foundry organisation capable of meeting the ever more exacting demands that the future will make.

Paris Foundry Congress.

The International Foundry Congress was opened on September 7 by the French Minister for Public Instruction, assisted by M. Léon Thomas, the President of the French Foundrymen's Technical Association, who is foundry manager to the Citroen concern.

M. Thomas first welcomed the foreign delegates, and said that the object of the Congress was the improvement of methods and the solution of interesting problems. He outlined pictures of the past and the future of the foundry, insisting that there was more room than ever for the technical man, who must replace the work of practical men who may or may not be particularly clever. His technique was definitely insufficient for modern progress.

M. Paul Ropsy, President of the International Foundrymen's Committee, then thanked the President on behalf of the foreign visitors, for his cordial welcome. He was followed by M. Vanzetti, of the Milan Steel Foundry Company, and M. Dufour, the President of the Employers' Federation, who also added their thanks. M. Luc, representing the Ministry, then formally declared the Congress open, and traced the history of the industry, showing how it had been dominant in primitive times, and latterly had contributed in no small measure to the development of modern ships, motor cars and aeroplanes. Finally, he expressed the hope that scientific methods would replace the impirical methods of the past.

M. Magdelenat, managing director of the Usines de Rosières, a Vice-President of the Association, presented the first Paper relative to the mechanical organisation of foundry work.

Later, the same day, there was the official opening of the Exhibition under the presidency of M. Queuille, Deputy Minister of Agriculture, who had with him many representatives of foreign Governments and Chambers of Commerce.

Closing Ceremony.

The Congress closed on the following Saturday, when M. Labbé, the director of Technical Education, was in the chair. M. Thomas took the opportunity of thanking the authors of the Papers, contributions which would have the effect of improving foundry organisation, its products and the status of its employees. He thanked the foreign delegates, and asked them not to forget French hospitality when they returned to their respective countries.

M. Labbé then gave a discourse on method, without which, he said, no work was possible. The work of the trained technician had simplified foundry problems, and this should result in inspiring foremen and workmen to emulate the endeavours. He congratulated the Paris Foundry High School on its work, which was rapidly supplying the industry with highly skilled technically trained men capable of promoting its best interests.

The Conference Banquet.

This well-arranged and admirably-served function was presided over by Monsieur Herriot, an ex-Prime Minister of France. He was supported by Messieurs L. Thomas (president of the Association Technique de Fonderie); Dufour (president of the French Foundry Employers' Federation); Paul Ropsy (president of the International Foundrymen's Committee and the Belgian Foundrymen's Association); Le Thomas (of the French Naval Construction Department); Ramas (past-president of the A.T.F.); Vanzetti (representing the Italian foundry industry); Sirowich (Professor at the Rome School of Engineering); Montupet (the largest aluminium founder in France); Stoffel (representing the Dutch Foundry Association); V. C. Faulkner (Editor of THE FOUNDRY TRADE JOURNAL); Ronceray (vice-president A.T.F.); Wesley Lambert (vice-president of the Institute of British Foundrymen); Portevin (Bessemer Medallist); España (representing Spanish foundry interests); Dr. Werner (president of the German Foundry Employers' Federation); Brasseur (representing the Luxembourg foundry interests); Dr. Geilenkirchen (Editor of *Die Giesserei*); Ledent (secretary of the Belgian Foundrymen's Association); T. Makemson (secretary of the I.B.F.); V. Delport (representing the American Foundrymen's Association); and Prof. Pishek (president of the Czecko-Slovakian Foundrymen's Association).

Amongst prominent British foundrymen present were: Mr. J. Cameron, J.P. (past-president of the I.B.F.); Mr. J. G. Pearce (director of the B.C.I.R.A.); Mr. Frank Russell (past-president The Refractories Association); Mr. H. Wood (Constructional Engineering Company, Birmingham); Mr. Sherburn (Fletcher Russel and Company, Warrington); Mr. Flavell (Birmingham); Mr. Flavell (Leamington); Mr. Mason and Mr. C. F. Walker (L.M.S.R., Wolverton, Bucks); Mr. Harper (Dudley); Mr. W. H. Poole (Keighley Laboratories); Mr. N. Ridsdale (Consulting Metallurgist, Middlesbrough); Mr. Sydney Evans (London); Mr. Sydney Beech (Universal System of Machine Moulding Company, London); Mr. Primrose (Falkirk); Mr. G. R. Loxton (Leeds); and Mr. Tomkins (Denbigh Machine Company, Dudley).

There were only four speakers, MM. Herriot, Thomas, Dufour and Ropsy. The speeches were of the usual type one associates with a French banquet in which everybody in turn is thanked for the efforts they have made in promoting either the welfare of the association, the exhibition or allied technical work. M. Herriot, however, took the opportunity to enlarge upon the necessity for research in the foundry industry and a correlation both national and international of its technical terms. It was an erudite discourse admirably delivered. The banquet was followed by a concert for which some of Paris' most prominent artists had been retained.

We believe that if the French could break away from tradition and hold their banquet nearer to the opening day of the conference there would be a larger attendance, as many prominent business men find it difficult to stay for the full period.

Paris Technical Sessions.

We are not at all satisfied that the high standard reached at the Paris Convention of 1922 has been maintained in the Papers presented to the Congress recently held. This is not meant as a wholesale condemnation, as some undoubtedly were of first-rate importance, but as a warning that the foundry research and technical personnel throughout the world is being strained in order to meet the local, national and international demand for more and more papers. Sessions were held in different languages, but owing to the attractions of the Exhibition it was not found possible to have one in English. Those held in French were somewhat spoilt by the poor acoustic properties of the lecture hall, aggravated to some extent by the auxiliary sessions held in adjoining partitioned-off rooms. In addition to these there were the sectional lunches at which there were to be technical discussions. Again the spirit of intimacy was absent because of the surroundings —a large typical exhibition restaurant roughly partitioned off. So far as the English-speaking luncheon was concerned, opportunity was taken to thank its chairman, Mr. Ronceray, for his untiring efforts to make the British visitors happy and to ask him to convey to his colleagues the appreciation of the cross-channel visitors. This was the only occasion which the head of the British delegation, Mr. Wesley Lambert, had of speaking publicly.

Works Visits.

The writer having had a vast experience of visiting works both *en masse* and *tout seul*, broke away from the routine of the congress, and, in company of two or three prominent officials of the Institute, had the pleasure of being personally conducted round two of the most up-to-date foundries in Europe. The reception accorded to this small party was both cordial and charming. It is therefore not pleasant to have to report that a certain amount of plant visitation was marred by lateness in starting, made worse by

ill-informed chauffeurs as to the destination sought. If what the French describe as "study journeys" are to be useful, then programmes and time-tables must be properly conceived and reasonably adhered to. The impression received by the British visitors of the Paris automobile foundries was of the highest. The use they are making of conveyor systems, moulding machines, powdered coal and heavy oil as fuel, combined with the progress achieved in die casting could not fail favourably to impress any right-thinking foundrymen.

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

Short Life of the Blast-Furnace Tuyere.

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—Tuyeres are made of as near 100 per cent. pure copper as possible. Other metals have been studied in connection with the making of tuyeres, but I believe all are agreed copper is the best and most suitable material. When in the furnace the tuyeres are water-cooled by means of outlet and inlet pipes, a system furnace operators believe to be inadequate.

It is a fact some tuyeres have a very short life, burning out very quickly, and usually at the same place, that is the top or highest point of the nose of the tuyere as set in position in the furnace. When the tuyeres are burning out quickly the tuyere users blame the tuyere as a casting; the tuyere makers in turn blame the cooling process.

It is possible for a tuyere, flawless as a casting, made of the best copper, to be placed in the furnace and be burned out at the top of the nose very quickly before the newness has been worn off the rest of the tuyere. A German tuyere was placed on the market and tried by a number of firms. Judged by the standard aimed at by the tuyere maker, and the specifications of the tuyere users, this German tuyere was ideal. The standard sought was a nose-hardened tuyere made of copper over 99 per cent. purity, the hardening was brought about by any process other than the addition of tin or any other hardening mixture to the copper. The shell of the German tuyere was pressed out of copper of 98 per cent. purity. In the process of pressing the hardening would be brought about without loosing toughness. The top of the tuyere was cast separately, and brazed on to the shell. When placed in the furnace there was no appreciable difference in the life of the German tuyere, and it is significant it burned out at the top of the nose similarly to its predecessors. On the other hand, it is possible for a cast tuyere of the same quality to be placed in the furnace to wear equally thin all round the nose and be taken out of the furnace after a very long life. It should be noted that the tuyeres having long life burn equally thin all round the nose, whilst the tuyeres of short life were holed *prematurely* at the nose. The word prematurely is used with hesitancy, as I believe it is perhaps due to the cooling of the tuyere being inefficient, or the lack of control of the water in the tuyere.

The quality of some of the tuyeres on the market is such that the life of the tuyeres should easily be doubled or even trebled.

The aim of the cooling system is to keep water circulating round the nose inside the tuyere. The design of the tuyere and position of the outlet indicate that the tuyere is always full of water, but the water is ejected from the tuyere spasmodically and not in a steady flow. Is it not possible that during intermittent periods the tuyere is only partially full? Is it possible for steam to generate and form a pocket at the highest point of the nose, that is the point of common failure?

In the old style tue iron, an iron tube twisted spirally with two or three loops, around which was cast iron to the shape of the present tuyeres, one end of the tube to be the inlet, the other the outlet, the water was controlled throughout the tue iron. In the coolers as used at present the water is controlled or guided throughout the cooler by means of partitions. In some tuyeres, too, an attempt has been made to control the water inside the tuyere by means of tubes and baffles or partitions, indicating that the designers recognise the advisability of controlling the water in the tuyeres.

With the possibility of tuyeres being holed or burned out at the top of the nose through inefficient cooling, an inferior tuyere and an ideal tuyere (that fulfil all the requirements) may be placed in a furnace at the *same time*, yet both tuyeres may be burned out at the *same time*. The ideal tuyere has not the chance to assert or to prove its superiority over the other tuyere. If the premature burning out could be prevented, and preventive measures were adopted, the ideal tuyere, that is worthy and capable of a much longer life, would come into its own.—Yours, etc.,

FRED PEEL.

49, Wicklow Street,
Middlesbrough.

International Foundry Exhibition, Paris, 1927.

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—It was very noticeable, on going through the above Exhibition in Paris, that not a single British flag was shown. Flags of a great many other nations were there, but, as in the Exhibition in Paris some years ago, the British flag was remarkable by its absence.

It was only when the writer drew the attention of the authorities to this at the previous exhibition that it was rectified.

It is to be hoped that when the Exhibition takes place in London in 1929, we shall have more respect for the flags of our visitors.—Yours, etc.,

H. SHILLITOE.

Astor House, Aldwych,
London, W.C.2.

Personal.

SIR MURDOCH MACDONALD has accepted the presidency of the Junior Institution of Engineers in succession to Engineer-Vice-Admiral Sir Robert B. Dixon.

MR. J. E. FLETCHER, the well-known consultant metallurgist, who, amongst other interests, acts for the British Cast-Iron Research Association, is leaving in the near future for a short business tour to the United States of America.

MR. WILLIAM HENRY GROOM, who has been in the employ of Messrs. Meynell & Sons, Limited, Wolverhampton, brassfounders, for fifty years, has been presented with a gold watch and chain to commemorate his service with the firm. Mr. Groom's father was with the same firm for fifty-one years.

MR. J. E. BAISTRICK, who has been in business at Keighley as a machine tool merchant, valuer and consulting engineer, is leaving to settle in New Zealand, and has lately been the recipient of presentations from the members of the Keighley Association of Engineers, in appreciation of his many services in office and otherwise to that organisation.

Wills.

ROEMMELE, C. H., of Kelvinside Gardens, Glasgow, iron merchant £20,841

ASHTON, J. H., of The Newlands, Todwick, Yorks, chairman of Skinner & Holford, Limited £12,039

FISHWICK, MR. ERNEST RICHARD, of Eberle Street, Liverpool, and Seaview Road, Wallasey, brassfounder, engineer and ironmonger (net personalty £11,898)..... £12,674

LEVIN, MR. HENRY (62), of Nether Street, North Finchley, N., and Sugar House Lane, Stratford, E., metal merchant (net personalty £5,869) £16,479

Cooling Conveyors for Castings.

It is authoritatively stated that there are 4½ miles of overhead conveyors in use at the new Buick Foundry at Flint, Michigan. The production of castings is now stated to be 750 tons of iron per 8½-hour day. The main use for this long conveyor is for the cooling of the castings. The pathway doubles back on itself several times. Actually it takes 1½ hours for the casting to traverse the whole length.

Information About Nickel.

The recent establishment of a Bureau of Information on Nickel, with offices at 2, Metal Exchange Buildings, Leadenhall Avenue, London, E.C.3, is an advent of industrial and scientific interest. The services of this Bureau are available to manufacturers, users, and all who are interested, entirely without charge or condition.

Despite the fact that nickel or nickel alloys enter into essential components of practically every industry at the present time, many more uses of this metal are known to science than are yet current in commercial practice.

Within the memory of the present generation, nickel was only thought of commercially in connection with nickel-plating, nickel silver alloys foreign coinages and nickel steels, but for over a century it had been the subject of the keenest scientific inquiries. Thus, when the mineral development of Canada gradually made possible large tonnages of nickel, industry was ready to make immediate use of them; but during the Great War the ever-increasing output of nickel was monopolised almost entirely by the various Government Departments for high-class work.

To-day, nickel holds an important place, not only in these industries, but also in a host of novel and diverse applications, such as corrosion-resisting, heat-resisting and electrically resistant alloys; ferro-nickel alloys; special steels and alloy cast iron; brasses and bronzes; the hydrogenation of oils; storage battery elements, and radio parts. The constant demand of present-day industry for superior and specialised alloys is being met by increasing and extensive scientific and industrial research. Designers, consultants and engineers have greater difficulty in keeping pace with the ever-increasing requirements of engineering practice, and must be acquainted with a much wider choice of materials than was known to their forefathers.

The Bureau of Information on Nickel, Limited, proposes to act helpfully in this connection, by collecting and correlating all information of a technical and practical character, with regard to the use of nickel and the numerous nickel alloys, and to place such knowledge freely at the disposal of British industry.

The manager of the Bureau is Mr. A. C. Sturney, B.Sc., A.R.S.M., who has been employed, until recently, as Research Assistant at the National Physical Laboratory.

Catalogues Received.

Cast-Iron Taps.—The September stock list issued by The Stanton Ironworks Company, Limited, is now available. It is accompanied by a second one on Spun Pipes, of which over 2,500 miles have already been supplied.

Special Alloy for Cast Iron.—After hearing at the recent Sheffield Convention of the Institute of British Foundrymen so much about the benefits to be obtained by the incorporation of nickel and chromium into cast iron, we were particularly interested to receive from Messrs. British Driver-Harris Company, Limited, of Albion Street, Manchester, brief particulars of their alloy Nicrome B, set out in a 4-page leaflet. In an accompanying letter the claims established are reasonable, but we feel that a statement to the effect that as nickel acts in the same general direction as Si, and the latter element should be kept low, would be advantageous. Nickel-chrome alloys have a serious amount of research work to fall back upon, and we consider that the two microphotographs shown on page 4 of the pamphlet should carry an indication of the magnification, and mode of preparation. The composition of the alloy has been arranged to contain 5 to 1 ratio of nickel to chrome, a proportion which has been found suitable for many types of foundry practice. The pamphlet is, we understand, available to our readers on application.

Aluminium Castings.—We are always pleased to receive catalogues from actual founders as well as those supplying that industry with plant and material. One of the most pleasing brochures received by us for a long time is that issued by Messrs. Rowland Hill & Sons, Limited, of King Street, Coventry. It contains 20 pages, and is jacketed in black paper covers, the front carrying a smart white medallion bearing the well-known Bull Dog trade mark of the company. The smartest selling point put forward is a statement as to the amount of scrap castings returned from customers during the year. This figure is 1.44 per cent. which, considering the amount of work of a difficult experimental character conducted by the firm, is extremely creditable. Other points well emphasised are the use of virgin metal, scientific control and cleanliness. The weak point of the catalogue is found on page 4, where when dealing with machine moulding an impression is left that if only economic conditions permitted hand moulding would be used, due to the phrase, "Sheer economic pressure enforces this principle." We would suggest the deletion of the statement and connect the third paragraph to the first by the conjunction "as." It would then read, "Whenever circumstances permit, we put patterns on plates for machine moulding, as definite advantages accrue, *e.g.*, uniformity of weight, increased accuracy, rapid output and long-lived patterns." The present second paragraph would follow, but would require slight modification to point out that this improved means of casting is, fortunately, the cheapest. Just another point in publicity is that on page 17 both photographs show men's coats hanging up on the walls or stanchions. We know most British foundrymen do this, but they should not.

Sand-Preparation Machinery.—The Universal System of Machine Moulding and Machinery Company, Limited, of 97, Queen Victoria Street, London, E.C.4, have sent us a 16-page pamphlet entirely devoted to this interesting subject. In the opening statement on sand milling the same old mistake of referring to clay as alumina is perpetrated. Alumina is Al_2O_3, whereas clay is $Al_2O_3,2SiO_2,3H_2O$. This, however, does not detract from the general good sense of the introductory paragraph. A very complete range of machines is described and illustrated. Primarily there is a good type of electrically-driven gyratory riddle, followed by three types of rotating sand sifter (box type), two being stationary and the other portable. A further type much used on the Continent is one having a flat surface. It is belt-driven, and ejects the refuse from the back of the machine. Of sand mills, three main types are shown. The first is designed for non-ferrous foundries, and consists of a hemispherical pan in which are rotated two hollow balls. It is difficult to learn from either the description or the illustration whether the pan is self-emptying. The second type has the appearance of the ordinary mortar mill, but the pan and the rollers revolve at different speeds. The third type is of a unique character. The pan is replaced by a circular plate and the disposal of the scrapers and comb ensure automatic cutting and discharge. The rollers are suspended about ½ in. above the table.

Amongst disintegrators, there are two of a novel character. The first is an adaptation of an older system, but employs ordinary large nails for the moving parts, which are obviously very easily and cheaply replaced if bent or broken. The other incorporates a throwing action, and was recently described and illustrated in these columns.

Finally, core-sand mixers are illustrated and designed. They are of the well-known and much-appreciated type originally designed, we believe, for mixing dough.

We were attracted by the choice of code words used, and would congratulate the inventor on his imagination.

Corrosion of Ferrous Metals.

From the net findings of the American Petroleum Institute and others, estimated annual losses ranging from $100,000,000 to $500,000,000, accrue on buried steel pipe lines. Experience has shown that foundry products such as cast iron, malleable iron, cast steel, and certain non-ferrous articles are more resistant to soil corrosion than rolled steel or iron.

Meeting Foreign Competition.

STEEL FOUNDERS' PROBLEMS.

At the opening meeting of the London Section, Institute of British Foundrymen, Mr. R. J. Shaw, the retiring chairman, presiding, Mr. W. B. Lake, the recently elected President, delivered his Presidential Address, in the course of which he said:—Mr. Shaw and Gentlemen:

Low Cost of Cast Iron an Essential.

In an engineering shop the profits are made or lost in the foundry. This was a remark which has remained fixed in my memory. It was made to my father when I was still in my teens by one of the wisest men I have ever known in our industry. And inasmuch as it means that a regular supply of sound, reliable castings, at an economic price, is a prime necessity to the majority of engineering concerns to enable them to get economical production, the statement is as true to-day as it was 40 years ago when it was made, and the majority of foundries being dependent for their existence on the continuation of the engineering trade, the interests of the two industries are so closely interwoven as to be almost identical.

Competition to be Met.

The engineering trade is by no means prosperous, for it is having grave difficulty in holding its own, both at home and abroad against Continental and American competition. In fact the exports of machinery have remained practically stationary since 1924, whilst the imports have increased by 50 per cent. This should be a matter of grave concern to the country as a whole, and to foundrymen in particular, for it is obvious that if we are to maintain our position in the engineering field a serious co-operative effort is necessary, and we may well consider what steps we can take to do our part by cheapening and improving the supply of castings. The two principal countries with which British engineers have to compete, though by no means the only ones, are the United States and Germany, and it is naturally interesting to examine the position of the foundries in these countries, so that we can judge the standard we have to reach, and at the same time ascertain what lessons we can learn from them.

American Methods.

Last autumn I had the privilege of being included in the party which attended the Detroit International Foundrymen's Convention, and at the outset I should like to take the opportunity of expressing my gratitude for the wonderful hospitality extended to us by our American friends. Not only were we splendidly entertained by them in every city in our itinerary, but we received a cordial welcome at every plant we visited, and the members of all the staffs spared no trouble to show us all they were doing and give us all the information we required. Visiting, as we did, a large number of foundries under these conditions we were able to appreciate the progress made by American Foundrymen.

It was, of course, obvious that they were working at a great advantage as compared with us, inasmuch as they had much larger quantities to handle, associated with a steadier demand and abundant capital for the provision of the latest labour-saving plant. Yet in spite of this the understanding mind could not fail to appreciate the wonderful achievement of the Americans in producing as they do, with practically no skilled moulders and with the wages of machine hands and labourers twice as high as in England, vast quantities of castings well suited for their purpose at prices lower than we can make them here.

Reasons for Success.

I was very anxious to discover the reasons for their undoubted success, and after discussing the matter with many people believe them to be:—(1) The large protected market which enables them to operate in large units; (2) the close co-operation which is maintained, not only among the staff but with the users of the castings, and also among the competing foundries themselves, and (3) the great use they make of specialists.

The employment of large units enables them successfully to employ labour-saving devices to an extent which is uneconomic in small foundries, and to engage the best class of men as managers and metallurgists (nearly every foundry executive I met was a University-trained man), with the result that they attain an output per man-hour three to four times greater than in Great Britain.

Then the co-operation between the foundry and the customer has led to the production of patterns so designed that they lend themselves to straightforward moulding and rapid production, and the co-operation with competitors has resulted in makers of particular classes of castings forming associations with a view to improving their product, an outstanding example being the American Malleable Iron Founders' Association, which retains the services of Professor Touceda.

The third reason I have mentioned as contributing to the success of the American foundries is not of so great importance as the preceding ones, but it is very real. The importance and prosperity of the American foundry industry has brought into existence a great number of firms who specialise in foundry equipment, and a number of experts in every line of foundry work, so that it is quite easy to get the exact equipment required for any job and expert advice on nearly any question which may arise.

Utilising the Outside Patternmaker.

As an example of the extent to which this system is carried, I would say that very few of the foundries I saw had large pattern shops. When they get a new order they send the drawings to an outside pattern maker, who supplies the patterns, tested, mounted on plates if desired, and sometimes gives them the proved production times. The employment of these experts relieves the managers of much work, and leaves them more time to concentrate on attaining economic production. Working under these conditions the Americans are making great progress in reducing costs and improving the quality of their castings, and we shall shortly find them able to sell their castings still more cheaply than at present.

German Conditions.

Let us now turn to Germany. During the inflation period most of the foundries used the enormous profits they then made to bring their plants right up-to-date, and they are, in the majority of cases, splendidly equipped. They suffered considerably from bad trade during the first period of deflation, but not nearly to the same extent as we did with our slump and strikes. Neither did they make the fatal mistake of taking work at any price when there was not enough to go round, but the German Foundry-owners' Federation succeeded in maintaining a set of minimum prices. These prices are calculated to give a fair profit on the actual cost of production in efficient foundries, and as the whole method of obtaining the costs is open to examination by any interested parties they find ready acceptance among the buyers of castings. This admirable system of maintaining prices in a bad time, although it could not enable the German foundries to make profits, did prevent the enormous losses which were incurred in many cases by price cutting in this country when we were suffering from a similar trade depression, and it provided another instance of what can be done by intelligent co-operation.

German Research Work Bearing Fruit.

Perhaps the greatest feature of the German foundry industry is the importance that is

attached to science. They have a great number of highly-trained metallurgists who are solely engaged in improving their products. I am informed that at Aachen alone more doctors of science are passed out every year than we have in the country at the present time. A great deal of attention has been paid to cast iron since the war. Anyone who studies the Patents column of THE FOUNDRY TRADE JOURNAL will have noticed the steady stream of German applications for patents for improved processes and appliances for the production of this material. Two of these new irons, viz., the Emmel and Lanz Perlitic, are already recognised as possessing great advantages for certain purposes, and those who have read the Paper given by Prof. Piwowarsky, of Aachen, to the Convention at Sheffield, in which he told us he had produced a cast iron with a tensile strength of 40 tons and an elongation of 2 per cent., must recognise that it is quite within the bounds of possibility that before long the Germans may shortly, by alloying and heat treatment, produce a cast iron which will in many fields displace both malleable iron and steel.

When I was over there in the spring of this year I saw that the use of technical knowledge was not confined to the big companies. I visited a number of foundries of medium size and found that at least one chemist was employed in every case, and that by using ferro-silicon and manganese in briquette form and desulphurising in tilting receivers they were producing good, easily-machining castings from the commonest scrap with a very small percentage of pig. The Germans are now studying American methods very closely, and we may expect them shortly to be extensively adopted under the name of "Rationalisation."

British Position.

Everyone will agree that it is no light task that lies before the British foundry industry to keep pace with the two countries I have mentioned, and must, I fear, concur with me that it is not in a favourable position to undertake it. The difficult conditions under which industry has been carried on of late years have adversely affected the foundries, perhaps to a greater degree than any other trade. The moulders' strike, the great slump of 1921, the railway strike, and finally the miners' strike, have all dealt them staggering blows. The last dispute cost one comparatively small foundry I know £15,000.

The steel castings trade, in which I am interested, has been very badly hit; I can readily call to mind a dozen that have closed entirely since 1921, and as far as one can judge from the meagre information available, it appears that in this country more money has been lost than made by making steel castings during this period. I am well aware that we have many very fine foundries, and that a great number of those which are engaged on specialities have done very well, but the majority of the British foundries, and especially those normally engaged in supplying castings to engineers, have not been able to make sufficient profits to attract the further capital required to bring their equipment into line with either their American or German competitors. In spite of this handicap, we have got to make progress or get left in the race for trade. What steps can we take to attain it?

Essentials for Progress.

Our great need is a period of profitable working so that we can attract fresh capital into the business. A measure of protection would be very helpful, but this the Government denies us, and it is evident that we must rely entirely on ourselves. To my mind there is only one practical solution to the question, and that lies in close co-operation between the foundries themselves and the other industries connected with the foundry trade. We have seen how co-operation has helped progress in America and prevented suicidal competition in Germany, and I see no reason why it should not be equally beneficial in this country, and we know it to be practical here, as we already have it working successfully between the makers of one class of casting. It seems to me that the close co-operation might be best attained by the formation of a foundry association, which would only admit as members foundries with a certain standard of efficiency. The association would divide its members into groups of those making the same class of castings, whilst the groups would employ the best experts procurable and also arrange for its members to specialise as far as possible on individual lines.

Fundamentals to be Observed.

If an association were formed on this basis, and it was always borne in mind that its main object was not to raise prices to enable inefficient foundries to remain in existence, but to put its members in a position to improve their efficiency to reduce the price of castings whilst making a reasonable profit, I believe the situation might be faced with some degree of confidence, for we shall always possess some of the best coke and iron, and still retain some first-class technicians and a vast store of practical knowledge, although at the present time we are not making the best use of them.

I know that some people will say that such an association is unnecessary, and that it would not function if formed, and I cannot blame them, for it is not long since I held similar views myself.

I am well aware that its formation would entail much hard work and would bristle with difficulties, but in view of the circumstances that exist to-day I see no other road to security for the foundry industry. There exists no body of men who enjoy the confidence of the foundry world so much as the Council of our own Institute. It would be of the greatest interest if we could get a lead from them on this important subject. Meanwhile there are certain practical steps we, as individual foundrymen can take to help the industry.

Research and Equipment.

We can support the Cast Iron Research Association, which is doing good work, and could do still more if it had more subscribing members. Then, if we will only recognise that our job is to get the best results from foundry plant and not to make it, we can place some of the work we now do ourselves with the equipment firms, and in most cases effect a real saving and at the same time help to create a stronger equipment industry which is an essential to increased efficiency in our own trade. Most of us rely on our JOURNAL to keep us up to date on all matters concerning our business, and it is obvious that the more of us who subscribe to it regularly the better service it can give us.

Finally, we can accord all possible support and assistance to the Institute of British Foundrymen. Not only has our Institute for many years rendered a great service to the industry by the dissemination of technical knowledge, but it has brought together and made acquainted foundrymen from all parts of the country, and has succeeded in engendering among them a spirit of friendship and goodwill which is a happy augury for the closer co-operation I am advocating.

We London members have special reason for doing everything in our power to strengthen our branch in the coming year. In 1929 the International Foundrymen's Convention is to be held in this city, and the President of the Institute for the year will be our esteemed friend and fellow-member, Mr. Wesley Lambert.

This signal honour involves us in a great responsibility, and I confidently appeal to everyone to do all they can to obtain new members, so that we be in a position to carry out our duties as the entertaining branch, in such a way as will give satisfaction to the Institute and be a credit to our President.

The thanks of the meeting were expressed to Mr. Lake by Mr. V. C. Faulkner and Mr. Wesley Lambert. Other votes of thanks were accorded to Mr. Shaw for coming to London from Newcastle to induct Mr. Lake, and to Mr. H. G. Sommerfield for his work during the past year as honorary secretary and treasurer.

It was announced during the evening that visits are to be made in the near future to Southern Foundries, Limited, of Croydon, and to Peterborough, where all the important local foundry establishments are throwing open their shops for inspection.

Foundry Exhibition in Paris.

By Our French Correspondent.

(*Continued from page* 232.)

It is a *sine qua non* for quantity production in foundry practice, that the moulding machine is only half the story. It is essential to get the sand to the machine and the moulds away from it with the utmost expedition. This feature was stressed in the Bonvillain and Ronceray exhibit, who had their seven machines served by an automatic sand distributing plant with a tapping point conveniently situated above each. A horse-shoe conveyor passed the moulds along to the casting place, where they were teemed; metal being provided by a 1-ton cupola. At the end of the conveyor the castings were stripped over a grid, the sand being elevated to be dealt with by a modern sand-preparing plant, and then is transported overhead finally to fill the hoppers placed above each machine.

Another interesting device was shown by the Vereinigte Schmirgel und Maschinen Fabriken A. G., of Hannover-Hainholz.

Various Other Machines.

As the shape and dimensions of castings can be seriously modified by badly fitting box parts, the foundries are employing more and more properly machined boxes. A well-made grinder for this purpose was shown by Hainholz. It is circular but not continuous, being made up from a series of segments in order to increase the efficiency of the working surface.

A refractory material called "Cloche," used for lining cupolas, convertors, ladles, etc., shown by the Elsenberger Klebsandwerke G.m.b.H., of Eisenberger (Palatinate) was a centre of attraction for the French foundrymen, where apparently rammed linings are not very well known.

Pig-Iron.

The Comité des Forges de France (a very powerful iron and steel manufacturers' association) had arranged an extensive and well thought-out co-operative exhibit of both pig-iron and finished material. For instance the important firm of Pont à Mousson, who of late years have been so successful in competing in the United States eastern seaboard market with their cast-iron pipes, were showing valves and taps. Steel-works were represented by Imphy, Paris-Outreau and Schneider et Cie, of Creusot. The latter emphasised their ability to produce high-grade manganese-steel castings having a tensile test of about 60-65 tons per sq. in., with 45 to 50 per cent. elongation.

Sand Preparation.

Pierre Hammers, of 40a, Karl Wilhelmstrasse, Karlsruhe, Germany, showed the "Planète" machine, which accomplishes the riddling, milling, mixing and aeration of both moulding and core sands without elevators or conveyors. It is provided with easily interchangeable riddle frames and the riddled sand falls into a rotating box, whilst foreign matter is ejected from the other side. The mixer has two sets of beaters rotating in opposite directions. Another machine which attracted a good deal of attention was shown by Thivet Hanetin, of 14, rue Ernest Renan, St. Dizier (Seine).

Ketin et Thiriart, the well-known Belgian firm who are represented in England by Mr. Sydney Evans, of London, showed their combined (three in one) sand preparing machine, which was so well received at the recent London exhibition.

Sand mixers which finally project the mixed sand into storage bins have recently come much into vogue. One make, not so well-known in Great Britain, was shown by O. Ullrich, of 3, Bitterfelderstrasse, Leipzig, Germany. This type is electrically driven and projects the sand by means of four rapidly rotating palettes. The "Royer," handled by the Pneulec Company in Great Britain, and shown by the Allied Machinery Company, was always the centre of an interested group of spectators. The Ingersoll-Rand Company were showing a new type of gyratory riddle.

Cleaning and Fettling.

A machine originally developed for grinding the flashes from crucible-steel ingots has, in recent years, been extended to foundry fettling shops. Those on show at this exhibition were certainly in advance of some pre-war designs we handled which were of German origin, and which were far too heavy for even the strongest of workmen to operate. The modern British makes are, we believe, in advance of most Continental designs, and efforts should be made to sell them abroad if tariffs and price margins will allow.

Amongst well-known makes of sand-blast apparatus we noticed the latest automatic type of Alfred Gutmann, who is represented in this country by Mr. Fearnley Allen, of Birmingham. Primarily the sand passes automatically to an upper chamber where it feeds, by the action of a counter weight, a lower chamber. This automatically controls a porte which rises and falls, opening and closing the aperture between the two chambers. This movement by counter-weights is replaced in the rotating-table type of machine by the tipping of a container in either direction, varying as to whether pressure is "on" or "off." The jet of sand in this case is made to "wander" all over the tray by means of a system of elliptical wheels.

Sissons-Lehmann repeated the exhibit which they had at the recent foundry show held last summer at the Agricultural Hall. Their affairs are now handled in Great Britain by Messrs. J. W. Jackman and Company. A sand-blast tumbling barrel was shown by Gueret, Porte et Cie, 36, Rue de Picpus, Paris 12; it is specially designed for small castings, and is internally divided into compartments.

Laboratory and Testing Apparatus.

The well-known Chevanarde dilatometer was shown by the Acieries d' Imphy, whilst an apparatus for measuring the permeability and strength of foundry sands was shown by the Vereinigte Schmirgel Co. It is based on the following principle:—The standard cylinder is rammed with sand by means of a definite number of jars, the cylinder thus filled has a known length and is placed above a reservoir of compressed air, and the time necessary to produce a certain fixed lowering of pressure in this reservoir by a passage of the air through the rammed sand is measured, this giving the strength of the permeability.

Several interesting machines were also shown by the Eths Krauss, of 18, Rue de Naples, Paris 8, these being mainly devoted to metallography.

A new testing machine was shown by the Cie Generale des Conduits d' Eau, of Liege, it is capable of registering hardness, tensile strength, transverse, shearing, etc.

Transport.

The problem of transport is of paramount importance to every foundry, and we were a little disappointed that, apart from the conveyor systems connected with moulding machines, very little space was devoted to standard examples, exceptionally, however, the Ebts Tourtellier, of 14, Avenue de Lutterbach, Mulhouse (Haut-Rhin) showed an aerial conveyor of the mono-rail type, which was remarkable for its smooth working.

Alloyed Cast Iron.

The various firms which exist in Great Britain, which have for one of their objects the interesting of foundrymen in the question of the improvement of cast iron by means of the introduction of nickel and nickel-chrome, were active through their corresponding French houses; the Driver-Harris Company, of Manchester, and the Bureau of Information on Nickel, London, both had stands well set out for emphasising the importance of this most interesting subject.

Bronzes and Alloys.

Probably the largest and most important section of the whole Exhibition was that organised by the brass and aluminium foundries. The exhibits arranged by the art foundries showed to advantage the degree of perfection reached by the French establishments. The aluminium foundries, too, have achieved a perfection in surface rarely

exceeded in any country. The largest of all French foundries, that of Montupet, showed a large number of Alpax castings; this foundry has apparently overcome the well-known difficulties usually associated with this alloy—that of blow holes. One casting in Alpax, but made by the Fonderies et Forges de Crans, was a complete motor-car chassis, whilst many interesting examples of die castings were shown by Etabs Zenith.

An Automobile Foundry.

The most interesting exhibit of the whole Exhibition was unquestionably that of Automobiles Citroen. *Inter alia* they had a working model of their Clichy foundry, which is recognised as being the most elaborate in Europe. Here one saw the unloading of the raw materials, the automatic transport direct into the cupola, the sand-preparing plant, the machine moulding of the castings by both the jar-rammers and sand slingers, the teeming of the castings and their subsequent fettling and dispatch. All this was mounted in a 60-ft. semi-circular panorama, the intervening space being occupied by a large-scale drawing of their latest type of chassis. From every point of this drawing tapes reached out to a semi-circular table, on which were mounted the numerous castings which go to make the modern automobile.

Foreign Sections.

Owing to a variety of circumstances, into which we do not propose to enter, there was no section devoted to British foundry produce or machinery, but Mr. Fossepiez, of Belgium, had a series of castings unsurpassed throughout the whole exhibition, which had been lent by British firms—Messrs. Armstrong-Whitworth; Austin Motors; Clyde Alloy and Leyland. The Belgians, however, had a very important exhibit, which showed clearly how important this country is, from the foundry standpoint. The Esperance Longdoz Company showed a roll with a curiously rough surface, specially designed for some process used in connection with cane sugar refinery. The Belgian Griffin Company, of Antwerp, had an exhibit designed to show how the application of modern scientific control had aided them to produce chilled castings of high quality.

The Italian Section, too, was of considerable size, and gave one the impression that these latecomers into the field of metallurgy were keeping abreast of the times, as was exemplified by the numerous castings they showed made from such alloys as elektron, silumin, duralumin, and the like.

Luxemburg and Spain also had their own sections; the former was really interesting, but the latter had nothing special to contribute.

Random Shots.

The fruits of an occasion like the Paris Convention can best be classified under three heads—the fruits of the exhibition, those of the conference and the Papers presented there, and those of the social and business intercourse involved in the whole affair. Probably the latter, while far the hardest to estimate, will, in the long run, prove the most valuable of all. While our American friends were unfortunately conspicuous by their absence, the intensely international character of the gathering was most stimulating and interesting. The English contingent was estimated at somewhere about a hundred, of whom, alas, very few were of the fair sex, those few being much in demand, but the Germans went one better and sent 150, including a large number of ladies. There were many Italians, Spanish, Swiss, Belgians, Dutch, Czecho-Slovakians, and others, and a stroll round the Conference rooms on the opening day provided a fascinating game of guessing identities and nationalities, and witnessing the renewing of old friendships and the formation of new ones.

* * *

As to the conference and the exhibition, each to his taste and each to his business, and probably no two visitors would agree on any one outstanding feature. Among the exhibits concerning which fairly general agreement was reached, however, in addition to the points noted last week, was a small-scale model of the Citröen foundry—a remarkable specimen of a working model in full running order. There were ample illustrations of the work of the French foundry schools, and one was tempted to wonder how many English institutes could show work of the same order or quality. The introduction of an historical section was also of great interest. Furthermore, no one could go round the exhibition without noticing the almost complete absence of British exhibitors, as a result of which—the Americans being by previous arrangement unrepresented—the Anglo-Saxon went practically unnoticed.

* * *

Glancing at the opening pages of the Shipping and Machinery Exhibition catalogue one is reminded of a cross between Debrett and the Engineer's Who's Who. (Has this latter publication met an untimely death, by the way?) But the urbane Mr. Bridges can always be depended upon to know What is What. . . .

* * *

Among purely foundry developments we noted the special economiser irons of E. Green and Son, Limited, the non-ferrous centrifugal castings by the Sheepbridge-Stokes Centrifugal Castings Company, Limited, and the electric-furnace iron and "oil-sand" mould castings of the Faringtøn Steel Foundry of Leyland Motors, Limited. Finally there was the new and apparently novel "Spun-Sorbitic" iron of Newton, Chambers & Company, Limited.

* * *

The number of metallurgical terms available is rapidly diminishing, and early application should be made to secure the use of troostite, austenite, and martensite. What about "hypertroostitic" or "super-hypoeutectic" for the next one? We trust that whoever wants to adopt either will kindly bear us in mind, for we have no intention of bothering the Patent Office with any registration. We have had some . . . .

* * *

One could not fail to notice the quantity of foreign machinery on show, as well as machinery built under foreign licenses.

* * *

There has been a tendency within the last few years to revive the policy of local trade exhibitions, of which the recent Midland Building Trades Exhibition, held in Birmingham, was an excellent example. As might be expected, the exhibitors were almost all local, and further, they consisted markedly of factors and retailers rather than makers. Thus there was scarcely any direct representation of light castings, although there were plenty to be seen in finished form on the numerous stands of domestic fittings.

* * *

The curriculum of the recently opened occupational school in Berlin makes provision for an hour per week to be devoted to some kind of physical exercise. . . . One cannot help feeling that there is something to be said for our British habit of treating our exercise as play rather than work . . . but they take these things more seriously in Germany. . . .

MARKSMAN.

Correspondence.

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—Your little story, in "Random Shots," of a vicar's intercession, reminds me of another.

The vicar, in this case, was asked by an elderly lady to pray for her floating kidney. Overcome with surprise, the worthy gentleman asked what had put such a crazy notion into the old dame's head. Whereupon she said, "I know you can do it if you like, vicar. Why, only last Sunday I heard you praying for all loose livers!"

Yours, etc.,

E. J. PENSTON.

Atlas Preservative Company,
September 15, 1927.

The Auxiliary Powdered Coal Firing of Cupolas.

In the melting process with auxiliary powdered coal firing which was introduced by A. Kaiser a certain quantity of the fuel, about 0.8 to 1.0 per cent. of the iron charge, together with compressed air, is blown into the furnace above the tuyères. By the burning of the coal powder which occurs between the coke pieces without interfering with the normal combustion a larger evolution of heat per unit volume is effected, resulting in faster melting the iron, that is in increasing the output of the furnace. On the other hand, the fact that part of the fuel is directly introduced into the combustion zone, and the better combustion ratio thereby attained, allows the coke charge to be reduced. By this the risk that the carbon dioxide of the combustion gases being reduced to carbon monoxide by the charge coke is diminished and the heat content of the gases can be used for pre-heating the iron. The distance of the coal-powder tuyère level from that of the blast tuyères is of great importance. If this distance be too great, there occurs a formation of carbon monoxide for want of oxygen; moreover, part of the powdered coal escapes through

TABLE I.

Inner diameter of the furnace		.. ..	2.95 ft.
Area of the furnace ..	..	.. ..	6.85 sq. ft.
Total height of the stack	..	.. ..	19.36 ft.
Number of blast tuyeres	..	.. ..	4
Area of blast tuyeres 1.21	0.59 ft.	=	0.71 sq. ft.
Total area of blast tuyeres		.. ..	2.84 sq. ft.
Distance between tuyere level and hearth level			4.13 ft.
Active height of the furnace		.. ..	15.22 ft.
Active height of furnace / Diameter of furnace		.. ..	5.15
Area of blast tuyeres / Area of furnace		.. ..	0.42 (1:2.4)
Number of powder tuyeres ..	..	.. ..	3
Area of powder tuyere 0.69	0.39 ft.	=	0.269 sq.ft.
Total area of powder tuyeres		.. ..	0.807 sq.ft.

TABLE III.

In.	1st experiment. Without auxiliary firing. Calories.	1st experiment. With auxiliary firing. Calories.	2nd experiment. Without auxiliary firing. Calories.	2nd experiment. With auxiliary firing. Calories.	Out.	1st experiment. Without auxiliary firing. Calories.	1st experiment. With auxiliary firing. Calories.	2nd experiment. Without auxiliary firing. Calories.	2nd experiment. With auxiliary firing. Calories.
(a) Iron charge	52,650	53,940	76,860	79,650	(a) Molten iron	9,218,805	8,822,259	8,949,171	8,714,015
(b) Coke charge dry ..	8,399	5,424	13,179	8,648	(b) Residual coke ..	60,048	74,311	53,480	60,655
(c) Moisture of coke charge	4,953	3,448	3,762	1,896	(c) Slag	864,189	765,765	824,880	644,909
(d) Coal powder dry ..	—	827	—	1,039	(d) Combustion gas: CO_2..	1,152,119	1,009,565	1,154,424	986,024
(e) Moisture of coal powder	—	36	—	25	CO ..	438,261	192,612	498,803	251,831
(f) Limestone	3,510	3,147	5,103	3,524	N_2 ..	3,558,938	2,684,391	3,749,655	2,858,836
(g) Blast dry: Oxygen ..	34,940	25,149	57,901	44,145	SO_2..	1,296	1,586	2,214	860
Nitrogen..	128,670	91,187	213,442	162,734	(e) Evaporation of the charge coke moisture ..	330,192	214,092	161,208	75,825
(h) Pressed air dry ..	—	2,967	—	3,713	(f) Evaporation of the coal powder moisture ..	—	2,232	—	981
(i) Moisture of blast ..	1,918	1,383	4,210	4,808	(g) Dissociation of the limestone ..	533,775	445,498	504,292	324,989
(k) Moisture of pressed air	—	33	—	78	(h) Loss	3,566,985	2,006,576	4,472,337	2,545,986
(l) Combustion of carbon to carbon dioxide	15,147,891	13,325,148	15,248,979	13,269,177					
Carbon monoxide	2,901,526	1,275,193	3,302,345	1,667,252					
(m) Formation of FeO ..	85,812	71,226	108,392	84,810					
(n) ,, ,, MnO ..	73,360	71,377	61,723	62,599					
(o) ,, ,, SiO_2 ..	1,152,970	1,187,549	1,233,224	1,056,514					
(p) ,, ,, P_2O_5 ..	113,679	79,182	16,862	4,766					
(q) ,, ,, SO_2 ..	14,366	17,581	24,542	9,533					
	19,724,608	16,218,797	20,370,464	16,464,911		19,724,608	16,218,797	20,370,464	16,464,911
Loss due to the formation of CO	6,730,589	2,958,029	7,658,357	3,867,478					
Total heat income when combustion is complete	26,454,497	19,176,826	28,028,821	20,332,389					
Burnt carbon from the fuel, kg.	3,075.94	2,146.74	3,178.59	2,251.88					
Heat income from the carbon when combustion is complete ..	24,915,114	17,388,594	25,746,579	18,240,288					

the stack without being burnt. The result is a lower temperature of the iron. On the other hand, if the distance be too small, the output of the furnace is lowered, the temperature of the iron remaining unchanged. As was stated by experiments, the best distance between the two levels, for a cupola with a inner diameter of 2.95 ft., is 6.69 in. In this case there are three tuyères for the coal powder; the pressure is 36.75 to 44.1 lb.; the inner diameter of the pipe line is 1.5 in. The starting of the cupola demands 0.492 cwt. of powder instead of 3.55 to 4.92 cwts. of coke; the starting period is thereby reduced from 5 to 2½ hours.

TABLE II.

	1st experiment.		2nd experiment.	
	Without auxiliary heating.	With auxiliary heating.	Without auxiliary heating.	With auxiliary heating.
Temperature of iron	1,350	1,365	1,400	1,359 Deg. C.
Total amount of iron molten ..	640	611	600	581 cwts.
Time of melting ..	6h. 10m.	4h. 30m.	4h. 55m.	3h. 52m.
Output per hour..	104	136	122	150 cwts.
Increase of output	—	30.8	—	23.0 per cent.
Output per hour per sq. ft. of furnace area ..	15.2	19.9	17.8	21.9 cwts.

In order to study the influence of the auxiliary firing on the melting process, P. Bardenheuer* carried on experiments with a cupola, the dimensions of which are given in Table I. In each experiment about 30 tons of iron were melted; the mixture was 30 per cent. of hematite, 20 per cent. German pig III, 10 per cent. Luxemburg pig, and 40 per cent. of scrap. From the results of the measurements there were made up material and heat balances. In the temperature measurement of the combustion gases there was used, besides the ordinary thermo-couple, the gas pyrometer invented by H. Schmidt. This pyrometer, a sketch of which is given in Fig. 1, operates as follows:—In order to prevent the heat exchange between the thermo-couple C and the surrounding cold material (iron and coke charges), the former is enclosed in a tube A. Before the measurement is taken, the hot junction B is electrically heated by a metal strip D to a temperature which might correspond to that of the gas; then, by means of the tube E a certain quantity of gas is sucked off, thereby passing the hot junction of the thermo-couple. When the temperature of the gas is higher than that of the thermo-couple the pointer of the galvanometer goes upwards, and *vice versa*. By regulating the heating current in the metal strip the right temperature reading can be obtained within a few minutes. The temperature readings taken with this pyrometer are higher by 100 to 150 deg. C. than that of the ordinary thermo-couple.

TABLE IV.

	1st experiment.			2nd experiment.		
	Without auxiliary firing.	With auxiliary firing.	Increase.	Without auxiliary firing.	With auxiliary firing.	Increase.
	%	%	%	%	%	%
N_1	37.00	50.74	37.14	34.76	47.77	37.43
N_2	34.85	46.00	32.00	31.97	42.86	34.27

In the first of the experiments in question the blast pressure was about 2.95 in. water gauge, in the second about 4.53 in. In the experiments the same temperature of the iron was aimed at

TABLE V.

		1st experiment.			2nd experiment.		
		Without auxiliary heating.	With auxiliary heating.	Decrease.	Without auxiliary heating.	With auxiliary heating.	Decrease.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Charge coke	Wet.	10.7	6.8	36.45	10.88	6.8	37.5
	Dry.	9.57	6.03	36.99	10.29	6.51	36.73
Coal powder	Wet.	—	0.928	—	—	0.786	—
	Dry.	—	0.920	—	—	0.782	—
Charge coke + coal powder.. ..	Wet.	10.7	7.728	27.78	10.88	7.586	30.28
	Dry.	9.57	6.950	27.38	10.29	7.292	29.14
Total fuel consumption (bed coke, charge coke, coal powder)	Wet.	11.81	8.73	26.08	12.16	8.83	27.38
	Dry.	10.49	7.44	26.22	11.47	8.45	26.33
Total fuel consumption (heating coke or coal powder included)	Wet.	12.38	8.81	28.84	12.99	8.91	31.41
	Dry.	11.00	7.82	28.91	12.41	8.54	31.18

TABLE VII.

Bar No.	Chemical composition.					Mechanical properties.			
	C.	Si.	Mn.	P.	S.	Tensile strength.	Transverse strength.	Deflection.	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	T/sq. in.	T/sq. in.	in.	
1*a* ..	3.32	2.13	0.97	0.22	0.091	19.05	30.30	0.378	
b ..	3.32	2.13	0.97	0.22	0.091	19.05	32.10	0.453	
2*a* ..	3.36	2.20	1.14	0.16	0.094	22.35	36.80	0.457	
b ..	3.36	2.20	1.14	0.16	0.094	21.65	35.05	0.421	
3*a* ..	3.26	2.27	1.16	0.16	0.092	20.0	34.15	0.414	
b ..	3.26	2.27	1.16	0.16	0.092	18.75	23.50	—	Iron shot in transverse test.
4*a* ..	3.21	2.28	1.01	0.19	0.097	18.55	29.10	0.449	Wet cast.
b ..	3.21	2.28	1.01	0.19	0.097	18.85	29.25	0.437	Wet cast.
5*a* ..	3.18	1.97	0.99	0.18	0.089	19.05	34.60	0.512	
b ..	3.18	1.97	0.99	0.18	0.089	17.90	32.85	0.504	
6*a* ..	3.10	1.94	0.97	0.25	0.091	20.65	32.85	0.394	Average Brinell hardness No. = 200.
b ..	3.10	1.94	0.97	0.25	0.091	—	35.20	0.449	
7*a* ..	3.21	1.97	1.04	0.24	0.093	19.95	35.70	0.488	
b ..	3.21	1.97	1.04	0.24	0.093	—	32.85	0.394	
8*a* ..	3.17	1.90	1.15	0.20	0.091	20.35	37.15	0.488	
b ..	3.17	1.90	1.15	0.20	0.091	—	34.80	0.478	
9*a* ..	3.19	2.07	1.10	0.24	0.090	—	33.50	0.441	
b ..	3.19	2.07	1.10	0.24	0.090	22.35	34.45	0.394	
10*a* ..	3.25	2.01	1.08	0.19	0.092	—	31.25	0.386	
b ..	3.25	2.01	1.08	0.19	0.092	17.75	28.70	0.453	
11*a* ..	3.14	2.07	0.99	0.21	0.096	17.90	31.75	0.512	

* Giesserei-Zeitung, 1927, No. 16, pp. 451-5. Stahl und Eisen, 1927, No. 34, pp. 1389-95.

(about 1,350 to 1,400 deg. C.), which could be obtained, as was stated by previous experiments, with a coke charge of 11.0 per cent., or with 7.0 per cent. of coke and 0.8 to 1.0 per cent. of coal powder. The temperature of the iron and the output of the furnace is given in Table II. From this it is seen that by the auxiliary firing the output is increased by 30.8 and 23.0 per cent. respectively. The heat balances given in Table III show

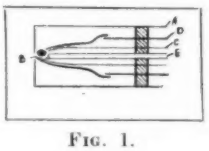


FIG. 1.

that in the case of the auxiliary firing the loss of heat due to the formation of carbon monoxide and to the heat content of the gases is definitely lower than in the ordinary melting process. Besides this, the loss by convection and radiation is diminished because of the shorter melting period. The degree of thermal efficiency of the furnace is given in Table IV. N_1 is the ratio of the heat content of the molten iron to the heat evolution of the fuel, supposing that complete combustion is attained; in N_2 the denominator

TABLE VI.

	1st experiment.			2nd experiment.		
	Without auxiliary heating.	With auxiliary heating.	Difference.	Without auxiliary heating.	With auxiliary heating.	Difference.
	%	%	%	%	%	%
CO_2	15.07	16.38	+ 8.69	14.6	15.2	+ 4.11
CO	8.86	4.83	−45.49	9.75	6.0	−38.46
O_2	—	—	—	0.65	1.2	+84.0

means the total amount of heat brought into the furnace. The coke consumption is given in Table V. As the moisture content of the coke was not the same in the two experiments, there are given the figures for the wet and the dry coke. The ash content of the coke was 7.27 per cent. in the first experiment and 8.28 per cent. in the second; the sulphur content was 0.8 per cent. The composition of the combustion gases is given in Table VI. According to the smaller amount of coke ash which is introduced into the furnace in the case of the auxiliary firing the amount of limestone can be reduced. This means a reduction of the amount of slag which was 8.22 and 18.94 per cent. in the experiments in question. The loss of iron by oxidation was 0.25 and 0.34 per cent. in the normal melting process compared with 0.23 and 0.27 in the case of the auxiliary firing. As to the other elements of the iron, the loss of carbon is a little higher in the case of the powdered-coal firing, and the gain in sulphur smaller according to the smaller amount of coke. Several hundreds of melts which were made with and without the auxiliary firing in the Babcock Works, Oberhausen, Rhineland, show that the diminution of the sulphur content in the former case is about 19.0 per cent. Though an influence of the auxiliary firing on the mechanical properties of the iron could not be stated in the experiments in question, other experiments since carried out show, as is seen from the figures given in Table VII, that by means of the auxiliary powdered-coal firing a high-duty cast iron can be obtained from the cupola without any difficulty.

Cast Iron Research.

The A.F.A. subcommittee on cast-iron research has submitted and had approved the following programme:—(*a*) Issuing of a bibliography on cast iron. This bibliography is being prepared under the auspices of the committee and is being financed by the use of the Rogers Brown Research fund of the A.F.A. (*b*) Summary of the best existing data on cast iron. To be prepared on completion of bibliography, and (*c*) formulating a comprehensive research programme as shown by review of the summary of cast iron data.

The Properties of Coke Affecting the Cupola Melting of Steel.

This Paper, which was printed on page 15 of the current volume, was presented by Mr. James T. MacKenzie to the Annual Meeting of the Institute of British Foundrymen on behalf of the American Foundrymen's Association. Mr. MacKenzie, having had an opportunity of reading the discussion, now sends us the following reply:—

Replying to Mr. Shaw: The author wrote that it was not the idea to obtain from each ladle exactly the same amounts of silicon, manganese, etc. In fact, it was felt that the information would be better if some variation in these were allowed, and, therefore, small taps were taken. It is well known that in using high percentage alloys and taking out small amounts, as was done in these experiments, the variations are likely to be very serious. In fact, in using ordinary materials it is common practice to use a receiving ladle so that better mixtures may be obtained. It should also be borne in mind that the small cupola used was only 18 in. in diameter, with a very low stack, so that an excess coke had to take the place of the stack, to some extent, in heating. He had tried rations of 6 to 1 of coke in all steel melts in this cupola, and was very successful in getting good temperatures, but with 17 per cent. ash coke the iron could not have been handled in the ladle if such coke ratios were used. Also, considering the fact that the surface of the cupola varies with the first power of the diameter and the area varies with the square of the diameter it can be readily seen that more coke is usually necessary in a small cupola than in a medium size. In larger cupolas other factors obtain, and this does not go to the other extreme. The same is the argument for the higher bed. With high ash coke it is necessary to push air through a very long column of coke to get the maximum temperature and carbon dioxide. If the right bed had been used for the Barrett coke he would not have been able to melt with the high ash beehive coke, and in order to keep the conditions the same, the bed was put at a point where it would work with these cokes, not with any idea that if he used Barrett coke in a cupola consistently he would ever dream of retaining a 40-in bed. His personal opinion is that if he had to use Dayton coke he would use a 60-in. bed.

As to the heavy coke ratios mentioned by Mr. Campion, it is not felt that this high amount of coke was selected as a mere convenience in handling the metal in small quantities because it gave such excessive high temperatures would change the ratio of the different cokes whatsoever if the amount was cut to, say, 6 to 1. In one case we were able to handle all of the melt, but at 6 to 1 we would not be able to handle the high ash coke at all. It is not believed that the relation between the different cokes would be changed at all by the absolute amount of coke used.

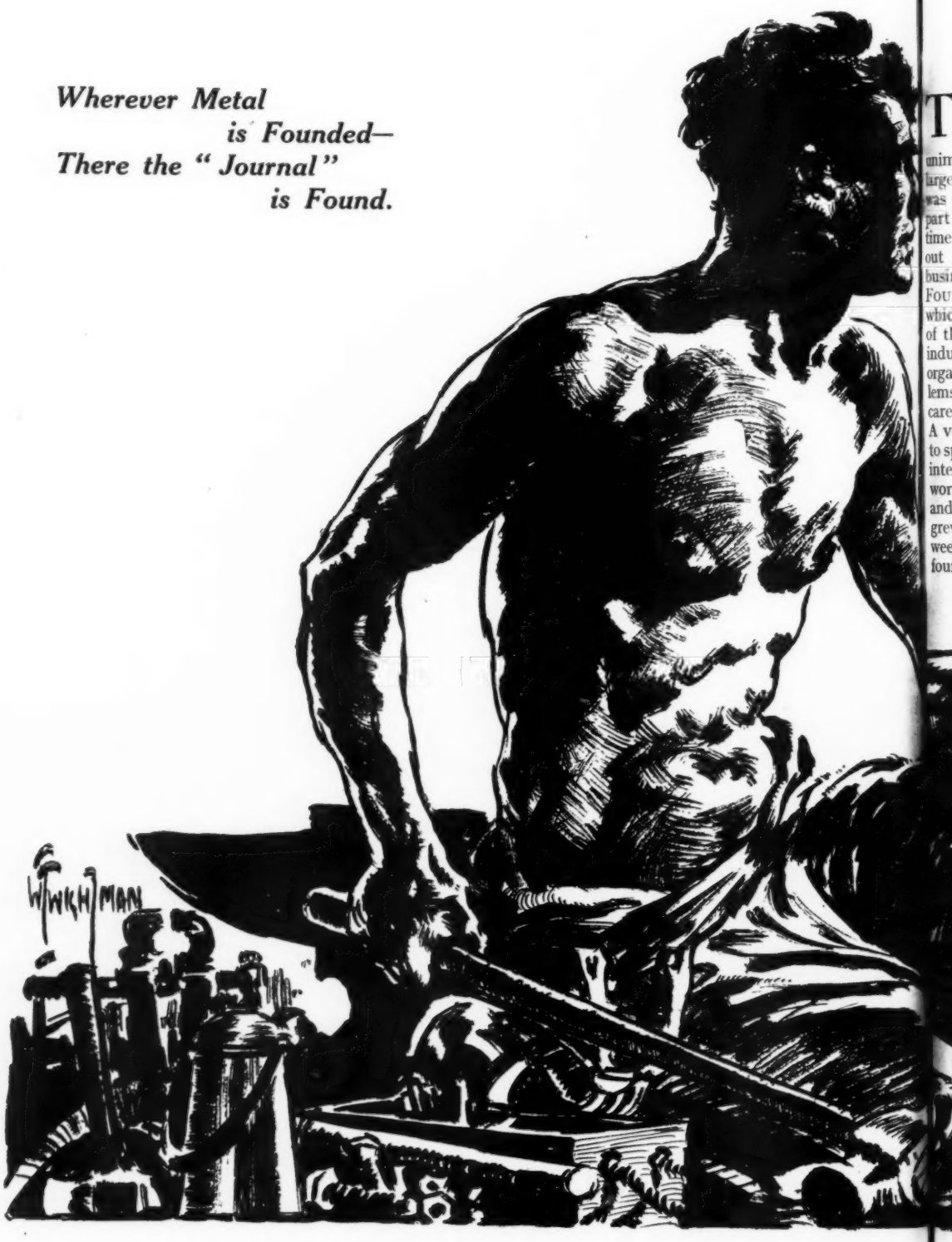
Replying to Dr. Becker's remarks, the author regrets that no figures were available for reactivity. In fact, there is very little unanimity of opinion as to the correct tests. A recent Paper by Prof. Parr, of the University of Illinois, seems to give a very useful test which can be carried out on a laboratory scale. We shall await Mr. Mott's experiments with considerable interest. This test would seem to be a larger scale modification of Prof. Bahr's, published in Stahl und Eisen, volume 44, pages 1 to 9 and 39 to 48. It is hoped that the University of Sheffield will obtain some of the more reactive cokes to supplement charcoal, which is the upper limit of Prof. Bahr's experiments. The author would be glad to send Mr. Mott a sample of the Barrett coke.

In conclusion, the author would thank Mr. J. E. Fletcher for abstracting the Paper, and also for his kindly remarks. A great deal of this work was done before the idea of a complete series came into being, and much information which would have been obtained had the programme been carefully made was not obtained in the earlier melts. As it was not possible to repeat these, on account of the exhaustion of the coke supplies, some data which were obtained on the last of the melts were not put into the table.

XUM

AN ENLARGED "FOUN
MARKS 25 YEARS OF

Wherever Metal
is Founded—
There the "Journal"
is Found.



URY TRADE JOURNAL"
F OGRESS AND SERVICE

1902 — Still growing Stronger — 1927

TWENTY-FIVE years ago there was born to the foundry trades of Great Britain a baby in the form of a small and seemingly unimportant monthly paper. It was not much larger than the modern theatre programme. Yet it was destined to grow with and become an integral part of a great and growing industry. Till that time the founding industry was more or less without science, without form and without voice—a business almost to be despised. The advent of THE FOUNDRY TRADE JOURNAL provided a nucleus which attracted the more enlightened members of the industry. It was from that date that the industry became scientific; technical bodies were organised for the mutual consideration of problems. Research stations came into being, and care was taken to foster international relations. A voice was given to the industry and it learned to speak and express itself so that engineers became interested, then fascinated and amazed with its work, and responded by providing better tools and new methods. And all this while the baby grew: THE FOUNDRY TRADE JOURNAL became a weekly organ, recognised and respected. To-day founding is acknowledged the Key of Key industries by erudite thinkers. Surely that is growth and progress!

Of the Future.

THE multi-sided founding industry cannot now be denied. Every day somewhere some expert is telling some audience of foundrymen about some development. Once again the JOURNAL—your JOURNAL—finds the space in which it moves too restricted. Its greatest need is space and more space, so now, for the fourth time, on its twenty-fifth birthday, it is to expand again. The issue for October 5th marks yet another milestone in the progress of THE FOUNDRY TRADE JOURNAL and the industry which it so proudly and efficiently serves. On that date it appears in a new form. There will be three columns per page instead of two. The great non-ferrous industry is to have a larger space, but not at the expense of iron and steel. The space devoted to these will likewise be increased.
It is a healthy sign, the way we are thus growing.

[By courtesy of the Editor of "Glasgow Evening News."

Rammed Linings for Cupolas.

Of late years the subject of monolithic or rammed linings for cupolas has been receiving the attention of foundrymen, and many have been successfully installed. Ignoring the claims made by manufacturers of plastic refractories for the purpose, it may be briefly stated that a well-rammed lining may be expected to give good service for upwards of two years with a minimum amount of expenditure on patching, whilst due to the compression the material undergoes in ramming better insulation is obtained, and heat which would find its way through the more open pores of bricks and between the joints is retained in the cupola, resulting in greater economy in melting. The installation of a monolithic lining is very simple and inexpensive, all the tackle required usually being at hand in the foundry. Selection of the material for the lining requires some consideration and care. It is not sufficient that it be highly refractory, many very high softening point refractories being quite useless for ramming, inasmuch as insufficient heat is generated to consolidate them throughout: and though the surface may be glazed, behind the glaze will be found nothing more than lightly bonded sand quite incapable of withstanding the abrasion of the charges.

The ideal refractory is one that not only takes a hard glazed surface and consolidates throughout at a comparatively low temperature, but is capable of resisting the greatest heat generated in the cupola when blowing. The material should be ordered forward several days prior to the date fixed for the ramming operation to begin, as it will require to be laid aside for a week or more under cover to allow of excessive moisture draining off. This is very important, otherwise difficulty will be experienced in ramming it down solid, considerable shrinkage will take place, and the finished lining will crack badly at the first application of heat. Having removed all the old brickwork from the bottom of the hearth to the sill of the charge door, a strong pulley block and chains is suspended from a girder or stout beam placed across the top of the stack, and a pattern of the required diameter is let down to the hearth and carefully centred. Whilst this operation is taking place inside the cupola, the ramming material is brought up on to the stage and a brazier lighted up in which to heat the rammers. The breast hole having been fitted with a template or shaped with loose bricks, the actual ramming operation commences. Enough material is sent down to fill the space between the pattern and the casing to a depth of three to four inches, and when this has been rammed down solid a further three or four inches is filled and rammed in the same way, and so on, until the top of the pattern is reached.

In the course of the first filling the slag and tap holes will be encountered, and these are formed by wooden shapes (as are the tuyeres at a later stage), and present no great difficulty. The pattern is now given the first pull up, and if the ramming has been well done there will be some difficulty in moving it, but a few encouraging taps underneath from a 14-lb. hammer will soon ease it. This first pull and all others should not exceed 4 in., as this is the greatest depth of ramming allowable if the finished lining is to be compact and solid. When the charge door level is reached the pattern is pulled up clear of the lining and bars placed beneath on to which it is lowered and the bolts holding the two halves together are removed, the two sections being then withdrawn through the charge door. If an angle iron has been left in position the bricklayers now proceed to do any bricking that may be necessary above the rammed level, but if no ring is in it is better to defer bricking until the lining has had its preliminary drying and all shrinkage has ceased. This shrinkage averages less than a quarter of an inch if the material is of the right consistency when rammed. Having knocked out the tuyere, tap and slag hole blocks and removed the bricks from the breast hole, the lining should be well vented, immediately following which a slow fire may be lighted up.

Venting is an important operation, as during the drying process large quantities of steam are given off, and if no exit is made for it the lining will be what is known in the brick industry as "steamed," and gaping cracks will be in evidence. The fire having been kept moderate for some hours is gradually increased and built up until it reaches well above tuyere level, and is a bright red heat, after which it is allowed to die out, all tuyeres being closed to exclude cold air meantime. When the cupola is cool enough to enter, any cracks which have appeared in the lining should be filled in, after which the cupola can be handed over to the tender care of the cupola man and charging gang on the stage, and, apart from the first few charges being laid in carefully, can be worked to its full capacity without misgivings.

Phosphorus in Steel Castings.

Major R. A. Bull, the A.F.A representative on the Joint Committee on Effects of Phosphorus and Sulphur in Steel, reported that the activities of this committee of interest to foundrymen related to the testing programme for determining the influence of phosphorus in steel castings. It has been decided to restrict this investigation to the testing of laboratory specimens, to use acid open-hearth steel; to employ two grades of steel from the standpoint of carbon content, viz., 0.25 per cent. and 0.45 per cent. The lower carbon steel will be made in five lots with the following phosphorus contents:—0.025 per cent., 0.04 per cent., 0.06 per cent., 0.07 per cent., and 0.10 per cent. The higher carbon steel will be made in three lots containing 0.02, 0.05, and 0.07 per cent. phosphorus. All lots of steel are to contain approximately 0.70 per cent. manganese, 0.35 per cent. silicon, and 0.045 per cent. sulphur, with no special alloys present.

The tests to be made will be tension, impact, hardness, fatigue, compression and torsion tests, all at normal temperatures, after the specimens are (1) annearel, (2) normalised, (3) normalised and drawn.

All heat-treating operations will be performed at the U.S. Bureau of Standards where the test specimens will be machined. One set of specimens will be tested at Watertown Arsenal, one at the Naval Experiment Station at Annapolis, and one at the Bureau of Standards.

The steel will be made in a 10-ton acid open-hearth furnace at the plant of the Atlantic Steel Castings Company, at Chester, Pa., under the direct observation of the sub-committee on manufacture, of the Joint Committee. The bars will be cast according to methods prescribed by a special committee consisting of a representative of the Atlantic Steel Castings Company, W. J. Corbett representing the Steel Founders' Society, John Howe Hall of the Taylor-Wharton Iron and Steel Company, representing the National Research Council, and R. A. Bull of the Electric Steel Founders' Research Group, representing the A.F.A.

Funds to defray the cost of these tests have been subscribed by manufacturers of steel castings, and include a contribution of $750,000, contributed by the Steel Founders' Society of America on behalf of the members of their group.

Pattern Standards.

Mr. D. M. Avey, chairman of the Joint Committee of the American Foundrymen's Association on Pattern Equipment Standardisation, has reported that the Committee recommended desirable practices for the following:—(1) Marking gauged surfaces and locating loose parts on patterns; (2) markings indicating chilled surfaces and metal insert on patterns; (3) colour mixtures for making patterns; (4) uniform types of pattern letters; (5) markings for loose pieces for patterns and core boxes; (6) minimum thicknesses of pattern plates; (7) schedule of sizes for fillets; (8) tentative standards were recommended for the following:—(9) Position of vibrator holes in match plates; (10) lug design for match plates; and (11) size and position of bolt holes in vibrators.

Shipping, Engineering and Machinery Exhibition at Olympia.

This Exhibition was opened last week by the Duke of Northumberland, the ceremony being followed by a banquet in the evening. The great building is well filled by an extensive and interesting display of exhibits, among those noted being the following:—

Allen-Liversidge, Limited, Victoria Station House, Westminster, S.W.1.—A full range of welding equipment is shown on this stand, including A-L dissolved acetylene (high-pressure) and A-L (low-pressure) plants for welding and metal-cutting; A-L electric arc welders and A-L "Pontelec" resistance welders, together with blowpipes, welding wires, electrodes and all accessories.

Alloy Welding Processes, Limited, 14-16, Church Street, Islington, N.1.—Electric arc-welding equipment is the feature of this exhibit. A new type of machine being marketed by the A.W.P. Company, and shown for the first time at this Exhibition, is a multi-operator equipment for three operators, using direct current at the arc. This should appeal to users owing to the very simple design of the equipment and the absence of moving parts such as contactors, etc.

Sir W. G. Armstrong-Whitworth & Company, Limited, Elswick Works, Newcastle-on-Tyne, and Openshaw Works, Manchester.—Among the exhibits are specimens of "Vibrac" steel, which possesses unique advantages for highly-stressed components of machinery and which is being increasingly adopted both at home and abroad for locomotive, automobile and aero engine work and many other duties. The well-known A.W. small tools, pneumatic tools, machine tools, non-ferrous products and other items are also shown.

Beecroft & Partners, Limited, St. Peter's Close, Sheffield.—This exhibit consists of test-pieces; samples of high-duty cast iron; products of research manufactured by the Company, including Puric cupola flux, ladle and brass fluxes, core oils, etc.

The British Oxygen Company, Limited, 69, Horseferry Road, Westminster, S.W.1.—This exhibit consists of "Universal" oxy-acetylene injector welding blowpipes, in various forms and sizes; "Universal" oxy-acetylene and oxy-coal-gas metal cutters, both for hand and machine use; oxy-coal-gas special brazing and lead-burning blowpipes, etc.

Cambridge Instrument Company, Limited, 45, Grosvenor Place, S.W.1.—On this stand is a representative collection of instruments for ships and engineering works, including electrical CO_2 and CO indicators and recorders, apparatus for recording the percentage of dissolved oxygen in boiler-feed water, draft and pressure gauges, temperature-measuring instruments, automatic temperature regulators, and other instruments for engineering and electrical measurements. An interesting part of the stand is the arrangement of typical groups of instruments mounted on panels, as they would be actually installed.

David Colville & Sons, Limited, 195, West George Street, Glasgow.—This firm exhibits several cases with specimens of beams, channels, angles, bulb angles, zeds, and several special sections, also round, square and hexagon bars, reeled bars, corrugated rounds and squares for ferro-concrete work, spring-steel bars, and other sections. Examples of structural work and steel arches as used in mines are shown. Foundry pig-iron, too, is prominently featured.

Thos. Firth & Sons, Limited, Norfolk Works, Sheffield.—A comprehensive range of manufactures made from Firth "Staybrite" and stainless steels are shown on this stand. With a yield point of some 15 tons per sq. in. and an elongation of 55 per cent. to 70 per cent., Firth's "Staybrite" steel has exceptional ductility combined with maximum corrosion-resisting qualities, resisting completely the corrosive action of atmospheric conditions, sea-water and many acids. It should be mentioned in this connection that a series of corrosion tests are on view. No difficulty is experienced in its manipulation, as shown by the exhaustive collection of exhibits made from this material for a variety of industries. Examples of interior or exterior decorative steel panelling and structural work made from Firth "Staybrite" are shown, as well as "Staybrite" signs embellished with enamel work. There is an interesting display of numerous examples of stainless-steel turbine blading, "Speedicut" high-speed steel, and Firth "Pnusnap" rivet snaps. There is also shown a range of steel turbine-casing castings.

Green & Son, Limited, Wakefield.—This firm exhibits their well-known fuel economisers for steam boilers—Tri-tube design, "H.V." smooth-tube design and gilled-tube design. Economiser accessories, *e.g.*, mild-steel casing, valves, reduction gears, steam soot-blowers, high-speed scaling equipment, etc., are displayed.

Hadfields, Limited, East Hecla and Hecla Works, Sheffield.—The chief feature of this exhibit is a special display of the firm's "ERA H.R." heat-resisting and "ERA C.R." non-corrodible steels, their special qualities being well illustrated by a variety of interesting demonstrations, and by articles indicating some of the many uses to which they have been applied for industrial purposes. The "ERA H.R." heat-resisting steel is remarkable for its extraordinary strength at temperatures up to 900 deg. C., and non-scaling character at temperatures up to and exceeding 1,000 deg. C. It is an excellent material for all engineering uses, including furnace components, involving high temperatures and oxidising conditions in the presence of sulphurous gases. Carbonising boxes, pyrometer tubes, recuperator castings, furnace components and other articles are shown in this steel. A special property of the "ERA C.R." non-corrodible steel is its resistance to a wide range of chemical agents, making it specially suitable for the construction of plant used in the numerous large-scale processes in which chemically active materials are dealt with, and under various conditions where serious corrosion of other metals would occur. The makers state that as a result of long-continued experiments it has now been made possible for tubes to be cold-drawn in this material. A further special feature of these non-corroding steels is the fact that their properties do not depend on heat-treatment or surface finish. They are not susceptible to hardening and tempering, and, in fact, possess marked physico-chemical stability, in consequence of which their characteristic structure and properties are not altered by heating. They lend themselves well to machining operations, which can be performed at the rate of 60 ft. per minute, using tools with a rake and angle similar to those employed for nickel-chrome steels, and using ordinary cutting compound as a lubricant. Of interest to the shipping industry is the remarkable toughness of Hadfield's "Hecla" forged steel; this is well illustrated by a portion of a marine shaft on view, which has been attacked by armour-piercing projectiles.

Igranic Electric Company, Limited, 147, Queen Victoria Street, E.C.—An extensive selection of switchgear is exhibited by this firm. It includes a "Varispede" pillar-type control panel, for variable-speed D.C. motors, which is essentially "fool-proof," and a reversing-drum controller, as used on both A.C. and D.C. supply systems, particularly for cranes and travelling gantries. Mounted on a frame-work are two automatic starters, one suitable for D.C. and the other for A.C. current. These are of the multiple-contactor type, and both are especially designed for starting large motors. Further exhibits include a star-delta starter mounted upon a pedestal, suitable for three-phase motors of the squirrel-cage type; and two types of contactors, mounted on slate bases. An exhibit of special interest on this stand is a working model (to scale) of the Igranic newspaper conveyor, for the speedy convevance of the printed papers from the presses to the publishers' tables. Another exhibit of interest is the 14-in. Type M brake, which has been adopted by a large number of shipbuilding and engineering works, for quick, safe and accurate stopping of machinery. The 5-in. lifting magnet shown is a miniature model of a device which has proved useful to users, and to reduce their handling costs to the minimum. Lifting magnets of this type are made in all sizes up to 76 in. diameter. A "Dean" valve control attached to a 12-in. valve is also shown. By its means the entire control of a gas, water or steam system can be centralised on a single control panel, within easy reach of the operating engineer or station superintendent.

Imperial Chemical Industries, Limited, King's Buildings, Smith Square, S.W.1.—The feature at this stand is an apparatus known as "Crawshaw's Chemical Colander," for cleaning greasy parts of machinery, such as gear boxes, axle shafts, silent chains, ball races, etc. It consists of a tank in the bottom of which a special chemical known as "Crawshawpol" is placed. This chemical boils at a very low temperature, and is heated by such means as may be available. In the upper portion of the tank there is a condensing coil, through which cold water circulates. The parts of machinery to be degreased are placed in the tank, and the closing of the lid and the turning on of a water-tap complete the first operation. When the chemical vaporises, it throws off fumes

which are condensed by means of the condensing coil; the result is a shower of "Crawshawpol," which rapidly removes the grease from the metal parts. They are delivered from the apparatus in a dry condition, all that is necessary being the use of a soft brush or air-blow to rid the surfaces of dust. An important feature claimed for the process is that after the chemical has dissolved and washed away the oil and grease from the work, it falls back to the supply at the bottom, where it is locked, and the continuous boiling of the chemical will not vaporise the oil, because it has a considerably higher boiling point than the chemical itself, so that once the oil is removed it will never get back on the work. A further advantage provided by the apparatus is its substantial labour-saving character.

International Foundry Equipment Company, of Sheffield, who have their stand in the gallery, are showing E.K. briquettes, oil furnaces, and literature dealing with the Rein cupola. It is the only stand purely devoted to foundry practice in the exhibition.

Major Robinson & Company, Limited, Sykes Street, Chester Road, Manchester, are showing various types of pipe-bending machines, but of special interest to foundrymen is Scols' special iron cement for filling defects in cast-iron.

Metropolitan-Vickers Electrical Company, Limited, Trafford Park, Manchester.—In addition to their condensate extraction pump, a description of which appears in another column of this issue, this Company are exhibiting specimens of their steam-operated air ejectors, which are to be preferred, under certain conditions, to the rotary air pump, because of the small space occupied, and also because of the entire absence of moving parts. The steam-operated air ejectors shown are made in three principal types, viz.: (1) Two-stage ejector without intercooler; (2) two-stage ejector with jet intercooler, and (3) two-stage ejector with surface coolers. In all cases the principle of operation consists in projecting a jet of steam at high velocity through an air chamber into a compressor pipe. The air is entrained by the steam, and, kinetic energy becoming transformed during the compression into potential energy, the mixture is discharged against a considerably higher pressure than that in the preceding air chamber. The work of compression is invariably done in two stages, in order to obtain greater efficiency.

A "Metropolitan-Vickers" high-speed pinion for 5,000 shaft-h.p. main propulsion turbines is also exhibited. The firm's reducing gears are of single- or double-reduction construction, and of either the rigid or the floating frame type. Double-helical involute teeth are employed throughout. First-reduction pinions are made of specially heat-treated alloy steel, and are of hollow construction, flexible driving shafts being passed through the pinions and keyed to the end remote from the turbine. Second-reduction pinions are cut from high-grade steel forgings, and are forged solid with their respective shafts. To obtain the maximum accuracy the Company have developed and patented a pinion-measuring machine, which in commercial practice will indicate errors in pitch of one-ten-thousandth part of an inch.

A vertical motor of 20 h.p., 220 volts, 1,200 r.p.m., with a speed range from 1,200 to 1,800 r.p.m., is also shown. It is one of a special line, mainly used in connection with marine centrifugal pumps. It takes up very little floor space and forms a very compact machine.

Premier Electric Welding Company, Abbey Wood, S.E. (a subsidiary company of **Imperial Chemical Industries, Limited**), have an interesting exhibit comprising the following:—Premier electric-arc welding plant and accessories; patented single-operator drooping-characteristic welding unit, complete with all instruments and accessories in water-tight steel case and ready for attachment to engine or motor, or for use as a belt set; a binary welder (Creedy's patent), which is claimed to be the lightest and most portable form of welding plant manufactured, suitable only for three-phase A.C. circuits; automatic and semi-automatic electric-arc welding appliances; multiple-operator plants for supplying electric welding current to a number of operators; electrodes for all purposes; and distance-control apparatus for controlling the current supply by a welding plant at any distance from the plant.

Quasi-Arc Company, Limited, 15, Grosvenor Gardens S.W.1, exhibit a comprehensive range of welding equipments and all the varieties of "Quasi-Arc" electrodes manufactured. Their Type "S" single welder motor-generator, suitable for direct-current working from A.C. or D.C. supplies, is shown in actual operation, demonstrations being given to interested visitors. This equipment is very compact, self-contained with the necessary control switchgear, and capable of supply current for all sizes of electrodes and all classes of work. Apparatus for multiple-welder installations to work from low voltage D.C. supply are also exhibited. Amongst the various A.C. and D.C. regulators shown for working on various voltages, type "A.C.70" (oil-cooled) for working from a 70-volt alternating-current supply, deserves special comment on account of its property of maintaining a wave-form of welding current to give correct welding conditions in spite of the strong wave-distorting action of the electric arc. A compact portable 10/12-h.p. petrol generating set, suitable for outside work or where no electrical or mechanical power is available, is also on view. A unique feature of this set is that it is fitted with a patent electro-mechanic governor which, while exceedingly simple, responds instantaneously to, and even anticipates, the demand upon the engine within the widest range, and also with the most delicate adjustment to the power required. Thus, in addition to mechanical speed regulation, the "Quasi-Arc" governor provides for any sudden demand made by the welding generator for increased power. Another exhibit is the new "Quasi-Arc" single welder rotary transformer, for use on polyphase supply systems. It is capable of transforming not only the voltage but also the phases, frequency and wave-form of the supply to the requirements of the welding circuit. In addition to the better welding conditions obtained, the apparatus has the great advantage that it will draw a perfectly balanced load from the mains at a high power factor, which can be made (if necessary) to compensate the power factor of the rest of the existing load. As no ohmic resistances are used for regulating the welding current, the efficiency of the plant is very high. "Quasi-Arc" electrodes in various sizes and types are also exhibited, together with examples of constructional work welded with them.

Ransomes, Sims & Jefferies, Limited, Orwell Works, Ipswich.—The major portion of the exhibit consists of four types of battery-driven 2-ton electric trucks, including: (1) Type C11, with high elevating platform and 2-wheel steering; (2) type C4a, with low elevating platform and 4-wheel steering; (3) truck with tiering platform, capable of raising loads to a height of 5 ft. 1 in.; (4) crane truck, fitted with half-ton swivelling crane, for use where heavy loads have to be lifted on to the platform of the truck. A "Ransome" Electric Runabout crane is shown. This crane is made in five capacities, namely, 7½, 15, 20, 25 and 30 cwts.

Transporting Machinery & Engineering Company, Limited, 76, Victoria Street, Westminster, London, S.W.1.—This firm are exhibiting mechanical handling, transporting and labour-saving machinery. A complete, accurate working model of a "Bleichert" bicable aerial ropeway is on view with various designs of cars to show the methods adopted in order to handle materials of a most varied and widely differing character. Other exhibits include the "TMEC" electric hoist blocks; the "Lizard" electric truck shown is claimed to represent the most modern development and practice for these vehicles, embodying this company's two-motor system and the patent footboard steering gear.

G. & J. Weir, Limited, Monel Dept., Cathcart, Glasgow.—On this stand are samples of monel metal, in the form of condenser tubes (solid drawn), turbine blading and shrouding; turbine garter springs; valves, seats and spindles, etc.; castings (rough and machined); forgings and stampings; deep pressings and spinrings; hot-rolled and cold-drawn bar, etc.

Wailes Dove Bitumastic, Limited, Newcastle-on-Tyne.—At this firm's stand are exhibited their well-known "Bitumastic" anti-corrosive specialities. Corrosion is treated from every aspect, and many interesting tests and experiments are being demonstrated. A special feature of the exhibit is that the stand is actually coated with their own materials, so that visitors may have the opportunity of inspecting "Bitumastic" under actual service.

Iron and Steel Trade in Rumania.—The leading iron and steel producers in Rumania have decided to establish a common bureau for selling their products. As soon as the bureau is set up, small merchants will not be able to buy direct from the producers, but only through their bureau.

A CO-OPERATIVE CONCERN, to be known as the Belgian Manufacturers' Corporation, has been formed for the creation of offices in British India for the sale in British India, Burma and Ceylon of the goods manufactured by the associates and for all commercial operations intended to develop the export of Belgian products to India. The participating concerns include: Ateliers de Construction de Charleroi, Ateliers Heuze-Malevez & Simon, Ateliers Van Acker, Anciens Etablissements Lobet, Ateliers Métallurgiques, Société Baume & Marpent, Usines Remy, Visseries & Tréfileries, La Turnhoutoise, Société Belge des Couleurs et Vernis, Cartoucherie Belge, Société Armes and Munitions, Banque Belge pour l'Etranger, and Fabrique Nationale d'Armes de Guerre.

The Growth of Cast Iron.

W. Schwimming and H. Flössner* carried on experiments on the growth of cast iron at moderate temperatures. The bars the composition of which is given in Table 1 were cast in sand moulds and machined to 160 mm. length and 15 mm. dia. In order to ensure correct measurement the ends of the bars were silvered or the gauge length was fixed by nickel rivets. The experiments were

TABLE I.

Bar No.	T.C.	Si.	Mn.	P.	S.
		Per cent.	Per cent.	Per cent.	Per cent.
2	3.49	2.56	0.46	0.735	0.135
3	3.50	2.65	0.74	0.240	0.104
4	3.68	2.47	0.91	0.128	0.062
5	3.32	2.75	0.51	0.830	0.154

made at 200 to 650 deg. C., by intermediate heating and cooling or by heating for long periods.

The experimental scheme is given in Table 2. together with the permanent change of length after cooling in per cent. of the original gauge length. It is to be seen that the growth does not begin until 450 deg. C. At 550 deg. C. the growth

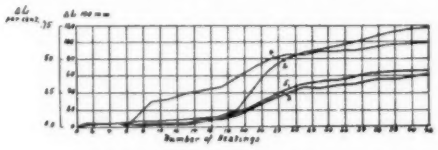


FIG. 1.

occurs in two different stages as is seen from the curves of Fig. 1 which represent the changes of length (ΔL) of the bars after a number of heatings at this temperature for three hours. In the first stage the growth is small and nearly proportional to the number of heatings; then the growth increases very rapidly and finally approaches a limit.

TABLE II.

Temp. Deg. C.	Bars. No.	Duration of heatings. Intermediate hours.	Duration of heatings. Permanent hours.	Growth of length.
		Hrs. mins.		Per cent.
200	2 to 5	141 9	—	0.00
320	,,	—	768	0.00
450	,,	6 9	—	0.01
450	3 and 4	9 48	—	0.04
550	2 to 5	42 3	—	0.37 to 0.72
550	4	—	124	0.51
600	2	18 3	—	0.75
650	2 to 5	31 3	—	0.75 to 1.0

The microscopical examination showed that up to the tenth heating no marked decomposition of the cementite occurred. The first part of the curves is characterised by the initial change of the pearlitic structure, that is by the structural change of the pearlitic cementite. At the same

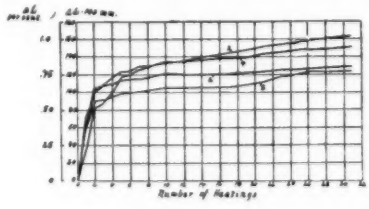


FIG. 2.

time there occurs a decomposition of some cementite lamellæ starting from their surfaces. At those spots the microstructure does not lose its geometrical make up but its richness of contrasts, that is the decomposed area as a whole, the ferrite included, becomes darker. The steep ascent of the curves is caused by the general decomposition of the cementite. Thereby the microscopical picture loses all its contrasts; finally, the dark spots become clear and take the look of ferrite. From this it may be concluded that the carbon of the decomposed cementite diffuses through the ferrite lamellæ in a finely divided state, the ferrite thereby taking the appearance of troostite or sorbite. Then the carbon crystallises at the graphite flakes present and when all the carbon has done so

TABLE III.

Bar No.		Graphite.	C. comb.	T.C.
2	Before	2.53	0.96	3.49
	After the 32nd heating ..	3.34	0.11	3.45
5	Before	2.48	0.84	3.32
	After the 32nd heating ..	3.24	0.03	3.27

the structure is ferritic. At 650 deg. C. the growth of the bars starts immediately, as is seen from Fig. 2. The decomposition of the cementite has finished after a few heatings; then the curve flattens and follows a direction nearly parallel to the abscissa. The microscopical examination showed that after the fourth heating

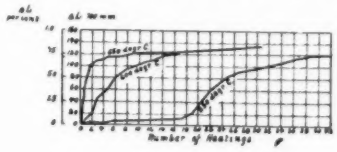


FIG. 3.

all the pearlite had decomposed. In the case of bar No. 5 it was observed that in the neighbourhood of the phosphide eutectic the pearlitic structure remained for the longest time. In Table 3 there are given the carbon contents of the bars Nos. 5 and 2 before and after being heated; the small percentages of combined carbon after the 32nd heating may perhaps be present in the phosphide eutectic.

The experiments show that the curves representing the growth of the bars approach a limit which corresponds to the total decomposition of the cementite; this is clearly seen from Fig. 3 showing the curves for bar No. 2 after the heatings at 550, 600 and 650 deg. C. respectively.

* Stahl und Eisen, 1927, No. 26, pp. 1057-9.

London Foundrymen Entertain Colleague.

Before the opening meeting of the London Branch held last Thursday at the Engineers' Club, the Branch Council entertained to dinner their retiring President, Mr. R. J. Shaw, who has left London to take charge of the foundries of Messrs. Henry Watson and Company, of Walker Gate. Mr. W. B. Lake presided, and on behalf of the Council presented Mr. Shaw with a silver cigarette box suitably engraved. The work of Mr. Shaw for the Institute was eulogised by the Chairman, who reminded his audience that Mr. Shaw had been a member for about 20 years. He had been largely instrumental in launching the Junior section during his very successful year of office.

American Foundrymen's Association.

The next meeting of the American Foundrymen's Association is to be held during the week beginning May 14, in Philadelphia, where Mr. Walter Wood, who is so well known in European foundry circles, is to act as chairman of the reception committee. There will be the usual Exhibition of foundry plant held in connection with the Congress.

It was announced at the opening meeting of the London Branch of the I.B.F., that the Right Honourable Arthur Henderson, P.C., was to be the principal guest at the annual dinner.

Conference on Engineering Materials, Berlin, 1927.

The preparations for the Conference on Engineering Materials, which is to take place from October 22 till November 13, are already well advanced. The programme of Papers contains about 200 lectures, to be read by scientists and practical engineers. Foreign scientists are due to speak, especially in connection with some series of lectures to be given on October 31. While these Papers, which are to be read at the Technical University of Charlottenburg, are intended chiefly for engineers, an exhibition of engineering materials arranged in the Neue Ausstellungshalle on the Kaiserdamm will be an attraction for the general public also. Everybody will have an opportunity of receiving an appreciation of the laboratories and testing shops of modern industrial establishments.

Three groups of engineering materials will be dealt with, namely, iron and steel, non-ferrous metals, and electrical-insulation materials. More than 200 testing machines are being shown in operation which will exemplify the latest methods of testing, some of which are not yet familiar even to engineers. Many inquiries on the part of foreign diplomats accredited in Berlin prove that the Continental and oversea engineering world is highly interested in this new and unique Congress.

Detailed particulars are available from the "Geschäftsstelle der Werkstofftagung," Ingenieurhaus, Berlin, N.W.7, whilst below we give a preliminary programme.

Preliminary Programme.

Saturday, October 22.

At 10.30 a.m., opening of the Engineering Materials' Exhibition, which will be accommodated in the Exhibition Hall, Berlin-Charlottenburg.

Sunday, October 23.

Annual meeting of the Verein deutscher Eisenhüttenleute.

Monday, October 24.

Morning, 1st series of lectures: Introductory Papers on research and co-operative work between the producing and consuming steel industries.

Afternoon, 2nd series: "Materials for Heating and Power Plants."

Afternoon, 3rd series: "Aluminium and its Alloys."

Tuesday, October 25.

Morning, 4th series: General meeting of the Deutsche Gesellschaft für Metallkunde.

Afternoon, 5th series: Lecture on mechanical and metallographic testing of steel.

Wednesday, October 26.

Morning, 6th series: Physical, chemical, and technological testing of steel.

Morning, 7th series: "Structure of Metals and Micrography."

Afternoon, 8th series: "Materials for Boiler and Turbine Design."

Afternoon, 9th series: "Requirements of the Mining Industry."

Afternoon, 10th series: Lectures of the Deutsche Gesellschaft für Metallkunde (Metallurgical Society).

Thursday, October 27.

Morning, 11th series: "Copper and Copper Alloys."

Morning, 12th series: "Materials for the Automotive and Aircraft Industries."

Morning, 13th series: "Materials for Structural Work and for Shipbuilding."

Afternoon, 14th series: "Materials for Railways and Tramways" (steel).

Afternoon, 15th series: "The Non-Ferrous Metals for the Aircraft and other Industries."

Afternoon, 16th series: Lectures of the Gesellschaft für angewandte Mathematik und Mechanik (Society for Applied Mathematics and Mechanics).

Friday, October 28.

Morning, 17th series: "Engineering Material for Agriculture."

Morning, 18th series: "Materials for Tools."

Morning, 19th series: Lectures of the Gesellschaft für angewandte Mathematik und Mechanik.

Morning, 20th series: "Mechanical Testing of the Non-Ferrous Metals."

Morning, 21st series: Report on Standardisation of Materials.

Afternoon, General meeting of the Deutschen Normenausschuss (German Standardising Committee).

Saturday, October 29.

Morning, 22nd series: Lectures of the Deutschen Ausschusses für technisches Schulwesen (Committee for Technical Training).

Morning, 23rd series: "Physical and Chemical Testing of Materials."

Morning, 24th series: "Materials for Mechanical Engineering."

Afternoon, 25th series: "Problems in Cutting Metals" (other than steel).

Afternoon, 26th series: "Problems in Working Sheet Material."

Monday, October 31.

Morning, 27th series: Lectures of theoretical and scientific character.

Afternoon, 28th series: Contributed by foreign scientists.

Tuesday, November 1.

Morning, 29th series: "Bearing Metals."

Morning, 30th series: "Welding and Soldering" (steel and iron).

Afternoon, 31st series: "Welding and Soldering" (non-ferrous metals).

Wednesday, November 2.

Morning, 32nd series: "Iron and Steel for Electrical Engineering."

Afternoon, 33rd series: "Metals for Electrical Engineering."

Thursday, November 3.

Morning, 34th series: "Insulating Materials for Electrical Engineering."

Morning, 35th series: "Non-ferrous Metals for the Chemical Industry."

Afternoon, 36th series: "Iron and Steel for the Chemical Industry."

Friday, November 4.

Morning, 37th series: "Materials for Die Casting."

Morning, 38th series: "Precious Metals as Engineering Materials."

New Companies.

Ardwick Engineering & Tool Company, Limited, 63, New York Street, Chorlton-on-Medlock, Manchester.—Capital £500 in £1 shares. Directors: R. A. G. Turner, C. C. Barbour, K. G. Evison and Annie Turner.

A. Fallon & Sons, Limited, Church Lane, Wolverhampton.—Capital £2,000 in £1 shares. Aluminium casters. Directors: R. T. Priestman and Mrs. L. A. Priestman.

Rotary Air Compressor Company, Limited.—Capital £5,000 in £1 shares, to acquire the benefit of agency agreement made between Demag Aktiengesellschaft and Maurice Warlow & Company. Directors: A. M. Warlow, The Granta, Creffield Road, Ealing, W.1; and S. R. Blades, 149, King's Road, Chelsea, S.W.3. Secretary: V. H. Jackson.

Spa Engineering Company, Limited.—Capital £1,000 in £1 shares, to acquire business carried on by T. P. Haslam and G. W. Poyser at Reliance Works, Matlock, Derby. Directors: T. P. Haslam (chairman), Bathfield House, Ashover, near Chesterfield; and G. W. Poyser, Hillcrest, Edge Road, Matlock.

Iron and Steel Output in August.

The National Federation of Iron and Steel Manufacturers report that the number of furnaces in blast at the end of August was 165, a net decrease of nine since the beginning of the month. Production of pig-iron in August amounted to 596,100 tons, compared with 645,800 tons in July and 651,300 tons in June. The August production included 195,500 tons of hematite, 188,000 tons of basic, 159,700 tons of foundry, and 26,000 tons of forge pig-iron.

The production of steel ingots and castings amounted to 644,500 tons in August compared with 687,100 tons in July and 747,300 tons in June.

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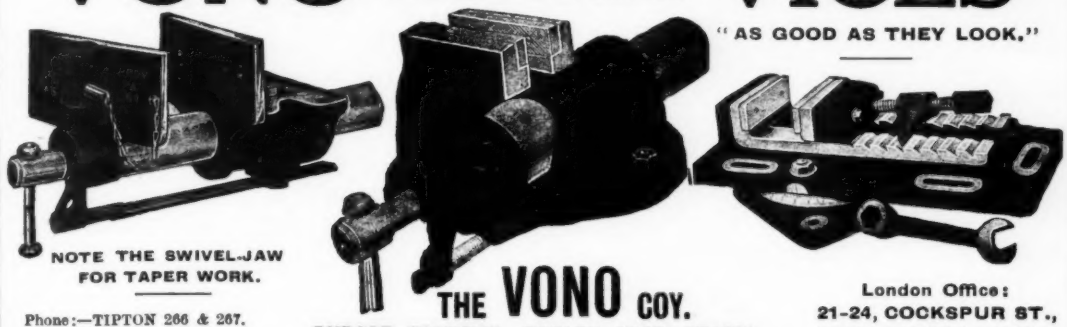

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Trade Talk.

CARIBONUM, LIMITED, have removed their city offices to 10 and 12, St. Martin's-le-Grand, London, E.C. The company's head office and works continue at the Caribonum Works, Leyton, E.10.

FROM SEPTEMBER 26 to October 8, No. 1 and No. 2 size Pneulec Royer sand mixing machines will be demonstrated at 114, Alexandra Parade, Glasgow. Mr. S. E. Smith and Mr. B. Lines will be in attendance to give all information required.

THE MERRIDALE WORKS, Merridale Street, Wolverhampton, formerly carried on by Henry Loveridge & Company, Limited, have been acquired by the Staffordshire Iron and Steel Company, Limited, of Brierley Hill.

THE ASHTON VALE IRON COMPANY, LIMITED, have realised their rolling-mills site and have invested a part of the proceeds in the acquisition of the extensive premises occupied by the company's South Liberty Brickmaking Works, adjoining the Great Western Railway.

ORDERS HAVE BEEN received by Bolckow, Vaughan & Company, Limited, of Middlesbrough, for 516 tons of tram rails, fishplates and soleplates for the Hull Corporation. The company has also received an order for 205 tons of special tram rails for the Mersey Docks and Harbour Board.

THE DOMINION IRON AND STEEL COMPANY have secured a contract for 3,600 tons of rails for the Jamaica railways, and one of 1,200 tons for the Colombian railways. The first-named order was secured in competition with the ERMA, and both orders in competition with American mills.

JOHNSON & PHILLIPS, LIMITED, Charlton, London, S.E.7, inform us that their branch depôts at Birmingham and Manchester are being moved in order to obtain greater storage space for their specialities. From to-day (September 16) the Manchester address will be 26, Corporation Street (stores in Hodsons Square, adjoining), while the Birmingham depôt will be transferred on September 29 to Suffolk House, Suffolk Street.

WE ARE INFORMED that a small company has recently been formed under the title of the Atlas Engineering Service, having an office at Cambridge House, Bakewell, Derbyshire. The partners are Messrs. L. S. Anderson and F. Conquer, while Mr. T. Scott Anderson, who is well known in engineering circles, is acting as technical advisor. Mr. Conquer's experience has been gained chiefly in marine and dockyard practice, while Mr. Anderson has had many years successful experience in metallurgy and electric welding. The new company will operate chiefly in the Midlands in representing the Crane Packing Company, of Slough, Bucks, and Weldrics (1922), Limited, of Beeston, Notts.

DRAFT REGULATIONS HAVE been issued by the Home Office giving effect to the unanimous recommendations of the Departmental Committee, which was appointed in 1923 to inquire into the circumstances and causes of accidents in shipbuilding and ship repairing, and on which both employers and workers were represented. It will be recalled that various objections were received, and in order to reach agreement it was necessary to discuss the points at issue with the Shipbuilding Employers' Federation and other employers' organisations and the various trade unions affected. The negotiations were successful, and it is understood that the draft regulations will be accepted by all the associations concerned.

THE "BOERSEN COURIER," of Berlin, is responsible for some extraordinary statements concerning the production of synthetic petrol in Germany. It is said that contracts for 120,000 tons of synthetic oils have been concluded for delivery during this year, and further that the annual capacity of the plant which yielded these oils, and which the "Interessen-Gemeinschaft" has established at Leuna, is to be raised to 300,000 tons. At Leuna it is claimed that 4,000 tons of coal are now being liquefied daily, and to provide for the proposed expansion the German Chemical Trust are developing their lignite mines in the Geissel Valley on a large scale. The "Boersen Courier" also states that unsuccessful efforts have been made by the Standard Oil and Shell undertakings to induce the Chemical Trust not to put their product on the market for a year or two. And we are finally informed that the cost of production of the new fuel is so low that it can be sold in competition with natural oils both at home and abroad.

MR. G. W. JACKSON, a special director of the Barrow works and joint commercial director of Vickers, Limited, has expressed his wish to retire from the service of the company, with which he has been connected for 25 years. Mr. W. E. Prichard will in future be in charge of all the commercial departments at Barrow.

Contracts Open.

Belfast, October 1.—(Specification No. W 64) (1) Cast-iron water pipes; (2) steel steam, exhaust and drain pipes; (3) water valves and fittings; (4) steam, feed and drain valves and fittings; (5) steam receiver; and (6) pipe coverings, for the Electricity Committee. Mr. F. H. Whysall, city electrical engineer and general manager, East Bridge Street, Belfast. (Fee £2 2s., returnable; extra copies £1 1s. each, non-returnable.)

Burnham, Somerset, September 30.—220 yds. of 10-in. diam. cast-iron pipe rising main, together with by-passes, sluice-valve chambers, etc., for the Burnham-on-Sea Urban District Council. Messrs. Willcox and Railkes, the engineers, 63, Temple Row, Birmingham. (Fee £3 3s., returnable.)

Dunedin, N.Z., November 12.—One overhead travelling crane complete, and with an electric hoist for lifting 4,480 lbs., etc., for the Dunedin City Corporation Tramways. The Department of Overseas Trade, 35, Old Queen Street, S.W.1. (Ref. A.X. 5,179.)

Haverfordwest, October 1.—2,500 yds. of 7-in. diam. cast-iron water mains, and valves, etc., for the Town Council. Mr. H. W. D. Williams, town clerk, 12, High Street, Haverfordwest. (Fee, £5 5s., returnable.)

London, N.1, September 27.—Castings and other ironwork, for the Islington Borough Council. The Borough Engineer, Municipal Buildings, Upper Street, N.1.

Manchester.—9,150 yds. of 6-in. bitumen-lined steel pipes, for the Waterworks Committee. The Waterworks Engineer, Town Hall, Manchester.

Melbourne, October 4.—54 cast-steel buckets, for the Melbourne Harbour Trust Commissioners. The Department of Overseas Trade, 35, Old Queen Street, S.W.1. (Ref. A.X. 5,193.)

Santiago, November 14.—(a) Two four-motor 40-ton electrically-operated overhead travelling cranes, etc.; (b) a rolling-stock repair workshop; and (c) one cargo lift, for the Chilean Public Works Department. The Department of Overseas Trade, 35, Old Queen Street, S.W.1. (Ref. A.X. 5,198.)

Wellington, N.Z., November 29.—Valves, pipes, bends and branches, for the New Zealand Public Works Department. The Department of Overseas Trade, 35, Old Queen Street, S.W.1. (Ref. A.X. 5,182.)

Company Reports.

Burt, Boulton & Haywood, Limited.—Final dividend, 5 per cent., less tax.

Central Provinces Manganese Ore Company, Limited.—Interim dividend, 10 per cent., free of tax.

Thomas Robinson & Sons, Limited.—Interim dividend, 6d. per share, less tax, on ordinary shares.

Cammell, Laird & Company, Limited.—No interim dividend on 5 per cent. cumulative preference shares or ordinary shares.

Hardy Patent Pick Company, Limited.—Profit, £3,899; dividend, 7 per cent., through appropriating £12,500 from reserves.

Thos. W. Ward, Limited.—Final dividend on ordinary capital, 3¾ per cent., free of tax, making 6¼ per cent., free of tax, for year.

Murex, Limited.—Profit, £14,376; depreciation, £2,026; dividend, 10 per cent., £7,306; carried forward, £6,193, against £1,150 brought in.

Coltness Iron Company, Limited.—Usual half-yearly dividends on first and second preference shares; interim dividend on ordinary shares, 5 per cent. (actual), less tax.

Wright, Bindley & Gell, Limited.—Net profit, £12,511; brought in, £3,437; dividend, 6 per cent. on ordinary shares, free of tax; carried forward, £2,908.

British Aluminium Company, Limited.—Interim dividend, 4 per cent. (actual), less tax, on ordinary; also dividend 6 per cent. per annum, less tax, on preference for six months.

Clayton & Shuttleworth, Limited.—Trading loss for 1926, £6,991; total loss, including bank interest, directors' fees, etc., £14,588; debit balance, £131,666; dividend on 5 per cent. preference shares in arrear as from December, 1921.

J. Brockhouse & Company, Limited.—Including £4,387 brought forward, profit £20,769; transferred from reserve, £2,500; available balance, £23,269; dividend on ordinary shares, 1s. per share, making 7½ per cent., free of tax; carry forward, £982.

Magnesite in Queensland.—Extensive magnesite deposits at Kunwarara in Queensland, on the North Coast railway line, are now being worked by the Kunwarara Magnesite Syndicate. Prospective orders indicate that it will not be long before 3,000 tons will be despatched monthly.

WOULD IT BE SAFE TO BUILD A HOUSE WITH GARDEN SOIL, OR ANYTHING THAT DOESN'T *SET* AND ACTUALLY *STICK* THE BRICKS TOGETHER?

NO.—Lime Mortar or Portland Cement is used because it SETS.

Then, why on earth build a furnace, oven or kiln, or set a boiler or line a chimney with raw fireclay which has no setting properties whatever, and gradually falls out of the joints unless intense heat is employed?

Many people are still unaware that there is an alternative to Fireclay, in

"PYROLYTE"

the unique, cold setting, fire cement, that sticks firebricks together cold into a firm, solid, monolithic whole, and makes what is actually a

ONE PIECE LINING

of which the joints last longer than the bricks themselves, and which will stand any heat, any slag, abrasion or alternations of temperature.

A dry powder, packed in air and watertight steel drums, with screw lids—**Sample cwt. 30/- d/d.**

Sole Makers:

General Refractories Company Ltd.

SHEFFIELD. LONDON. GLASGOW.

Use our British Monomark **BCM/GRC LONDON**

Telephone: 22311 SHEFFIELD. *Telegrams: "REFRACTORY, SHEFFIELD."*

IRON AND STEEL MARKETS.

Pig-iron.

MIDDLESBROUGH.—As predicted in recent reports, the Cleveland iron market has developed a more stable tendency than has been experienced for some time, with continuous improvement in the volume of business transacted each week, on a scale of steady and progressive expansion. Market confidence having been again restored, buying is no longer restricted to limited emergency dealings, and although optimism is still tempered with caution, there is greater disposition on the part of consumers to entertain offers for forward business. At all events, the cut in Cleveland pig-iron prices has been sufficient to shut out foreign iron from the home market, and whilst in Scotland, Continental iron can still compete, the preference for Tees-side iron is tipping the scales in favour of the home product. Meanwhile prices are all firm and unchanged, as follow:—No. 1 Cleveland foundry iron, 70s. per ton; No. 3 G.M.B., 67s. 6d.; No. 4 foundry, 66s. 6d.; No. 4 forge, 66s. The foregoing are home prices, and on all sales to Scotland or abroad there is a discount of 2s. 6d. per ton.

The improved conditions noted above in Cleveland pig are also reflected in the hematite section, demand now having overtaken production, with stocks in hand steadily diminishing. Prices also have stiffened to some extent, and are firmly quoted at 75s. per ton for East Coast mixed numbers, with the usual 6d. per ton extra for No. 1 quality. On the North West Coast, Bessemer mixed numbers are also quoted at 75s. per ton.

LANCASHIRE.—In this district some improvement may be observed in the demand for foundry pig, but so far the movement is not sufficiently pronounced to affect prices. Staffordshire makers still quoting 74s. 9d. per ton, Derbyshire 73s. to 73s. 6d., and Cleveland No. 3 80s. 8d. per ton, all for delivery Manchester or equal.

THE MIDLANDS.—Consumers of foundry pig in this area still maintain a conservative attitude as regards buying on future account, and business meanwhile is uneventful. Prices are firmly held at previous rates, No. 3 Derbyshire being quoted at 65s., No. 3 Northants 60s. to 61s., North Staffordshire No. 3 round about 65s. f.o.t. furnaces, and Lincolnshire No. 3 at 80s. per ton delivered.

SCOTLAND.—Although slightly more activity is apparent in the market for foundry iron, there is little to indicate the near approach of a really substantial buying movement. Some few contracts are being entered into for foundry and basic pig, but business transacted is chiefly in small lots for early delivery.

Finished Iron.

So far as can be ascertained, business in the manufacturing sections of the iron trade continues dull to the point of depression, and makers are mostly hard pressed to keep works fully employed. There is keen competition for all fresh business, especially for crown and cheaper quality bars. The former can be obtained both from works in the Birmingham district and those farther afield at £9 10s. delivered locally for ordinary specifications, but odd lots are quoted £9 15s. to £10. Nut and bolt iron is offered between £9 and £9 5s., but little business is being obtained by the local ironworks. Staffordshire marked bars are quoted at £13 10s. at works. Business in this direction is reported to be somewhat better, although still far from good.

Steel.

Business generally in this section continues quiet, and without alteration in the price of English billets or sheet bars, which are quoted from £6 per ton and upwards, but it is reported that Welsh semis have been offered at a shilling or two below £6 delivered into the Birmingham area. The condition of the tinplate market remains unchanged, and business continues slack. The demand is most unsatisfactory, as buyers continue to limit their purchases to early and urgent requirements. Several works are idle, and the competition for orders is of a very keen description.

Scrap.

Reports from most centres of the scrap metal trade continue unsatisfactory, demand being much below the average for this period of the year, while prices as a rule are at levels exceeding consumers' expectation. At Birmingham, however, cast-iron borings are firmer at 7s. 6d. to 30s. per ton, f.o.t., while there is a good demand for cast-iron scrap, in cupola sizes, at 72s. 6d. per ton delivered, but light cast-iron scrap is weak at 57s. 6d. per ton delivered. In Scotland heavy machinery cast-iron scrap is in quiet demand at 69s. to 70s. per ton, and heavy ordinary quality at 5s. per ton less, both delivered and f.o.t. consumers' works.

Metals.

Copper.—Conditions in the market for warrant copper of late have been lacking in any incidents of outstanding interest, disclosing, however, considerable reluctance on the part of consumers to entertain further commitments until the outlook becomes more clearly defined. Values have fluctuated within narrow compass, and, although affected temporarily by some liquidation, latterly the metal has been rather harder under firmer American cables and expectations that the near future may see a fresh buying movement of some importance across the Atlantic.

Official closing prices of standard copper have been as follow:—

Cash: Thursday, £54 18s. 9d. to £55; Friday, £55 1s. 3d. to £55 2s. 6d.; Monday, £55 5s. to £55 6s. 3d.; Tuesday, £54 15s. to £54 16s. 3d.; Wednesday, £54 13s. 9d. to £54 15s.

Three Months: Thursday, £55 8s. 9d. to £55 10s.; Friday, £55 11s. 3d. to £55 12s. 6d.; Monday, £55 13s. 9d. to £55 15s.; Tuesday, £55 3s. 9d. to £55 5s.; Wednesday, £55 2s. 6d. to £55 3s. 9d.

Tin.—The tendency in standard tin values also has developed further weakness, notwithstanding the comparatively favourable statistical position, business having been much restricted in volume during the past week or two. The deliveries during August made a good showing, totalling 10,140 tons. The visible supply was, on August 31, 13,434 tons, comparing with a little over 13,000 tons at the same date last year.

Official closing prices of standard tin have been as under:—

Cash: Thursday, £286 to £286 2s. 6d.; Friday, £285 5s. to £285 10s.; Monday, £284 15s. to £285; Tuesday, £279 15s. to £279 17s. 6d.; Wednesday, £278 15s. to £278 17s. 6d.

Three Months: Thursday, £281 to £281 5s.; Friday, £279 10s. to £279 15s.; Monday, £278 15s. to £279; Tuesday, £276 to £276 5s.; Wednesday, £274 15s. to £274 17s. 6d.

Spelter.—This section of the market has again relapsed into dulness, but prices indicate a slight recovery from the lower levels lately recorded. Continental smelters, however, are not pressing offers in this market, but at the same time the galvanising industry is but poorly employed, sheet makers in particular being in need of more business.

The following are the week's prices:—

Ordinary: Thursday, £27 11s. 3d.; Friday, £27 12s. 6d.; Monday, £27 10s.; Tuesday, £27 6s. 3d.; Wednesday, £27 2s. 6d.

Lead.—The market for soft foreign pig is again distinctly disappointing, having lost the improvement recently noted, and the outlook is far from favourable in view of the large surplus stocks still undiminished. The metal undoubtedly still suffers from over-production, accumulated stocks and a poor industrial consumption; the fundamental weakness, therefore, lies in conditions governing supply and demand.

The week's prices are appended:—

Soft foreign (prompt): Thursday, £21 16s. 3d.; Friday £21 16s. 3d.; Monday, £21 16s. 3d.; Tuesday, £21 12s. 6d.; Wednesday, £21 10s.

Death of Mr. J. J. Morrison.

We regret to announce the sudden death of Mr. J. J. Morrison, the foundry manager of the Southern Foundries, at Waddon, near Croydon. Mr. Morrison was playing bowls at Chiswick in the Surrey v. Middlesex contest, and collapsed on the green after the match, dying immediately. The body has been taken back to Glasgow for burial in his native town. The deceased gentleman, who was 64 years of age, was for over 20 years with the Carron Company at Falkirk, and then transferred to a foundry concern in the Glasgow area. Some twelve months ago he took over the management of the Southern Foundries.

THE SECRETARY OF THE City of London College announces that a course of twenty-five lectures on "Iron and Steel" on Tuesdays, commencing on September 20, and a course of twenty lectures on "Special Steels and Non-Ferrous Metals" on Thursdays, commencing on September 22, will be given by Mr. T. Barton Kelly.

Sterling

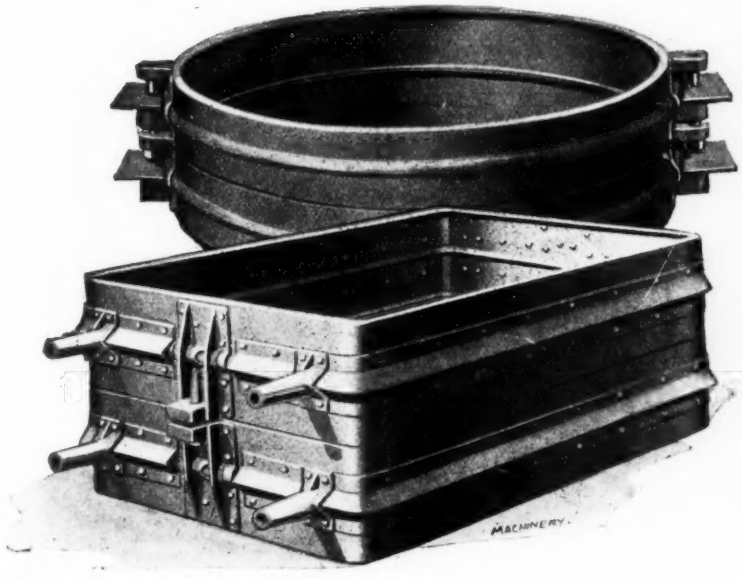
MODERN FOUNDRY PRACTICE DEMANDS

LIGHT
RIGID
ACCURATE **BOXES**

Boxes that can be handled rapidly without fear of breakage or distortion. That will produce castings true to pattern every time and with unskilled labour. Boxes that will - maintain their accuracy through years of service. -

STERLING BOXES ARE DESIGNED TO SATISFY THESE REQUIREMENTS. THEY ARE MADE TO MEET THE MOST EXACTING CONDITIONS OF UP - TO - DATE FOUNDRY SERVICE.

THAT IS WHY STERLING BOXES ARE FOUND IN ALL MODERN FOUNDRY ESTABLISHMENTS.



STERLING FOUNDRY SPECIALTIES LTD.

BEDFORD

London Office: 13, VICTORIA STREET, S.W.1.

WEEKLY PRICE CURRENT.

COPPER.

	£	s.	d.
Standard cash	54	13	9
Three months	55	2	6
Electrolytic	62	5	0
Tough	60	10	0
Best selected	59	15	0
Sheets	86	0	0
India	71	0	0
Wire bars	62	5	0
Do. September	62	5	0
Do. October	62	5	0
Ingot bars	62	5	0
H.C. wire rods	66	15	0
Off. av. cash, Aug. 55	8	0	7/11
Do. 3 mths. Aug. 55	15	2	5/11
Do., Sttlmnt. Aug. 55	8	0	9/11
Do., Electro, Aug. 62	8	6	3/11
Do., B.S., Aug.	60	18	7½
Aver. spot price copper, Aug.	55	8	0½
Do., wire bars, Aug.	62	12	4½
Solid drawn tubes			12½d.
Brazed tubes			12½d.
Wire			9½d.

BRASS.

Solid drawn tubes	11½d
Brazed tubes	13½d.
Rods, drawn	10½d.
Rods, extd. or rlld.	7½d.
Sheets to 10 w.g.	9½d.
Wire	9½d.
Rolled metal	9½d.
Yellow metal rods	7½d.
Do. 4 × 4 Squares	8d.
Do. 4 × 3 Sheets	8½d.

TIN.

	£	s.	d.
Standard cash	278	15	0
Three months	274	15	0
English	276	10	0
Bars	278	10	0
Straits	285	15	0
Australian	284	15	0
Eastern	280	15	0
Banca	290	15	0
Off.avr.cash, Aug. 293	6	0	2/11
Do., 3 mths., Aug. 296	13	7	7/11
Do., Sttlmt. Aug. 293	4	9	3/11
Aver. spot, Aug. 293	6	1	

SPELTER.

	£	s.	d.
Ordinary	27	2	6
Remelted	25	15	0
Hard	21	10	0
Electro 99.9	30	15	0
English	27	15	0
India	23	15	0
Zinc dust	36	0	0
Zinc ashes	9	5	0
Off. aver., Aug.	28	2	9/22
Aver., spot, Aug.	28	4	2½

LEAD.

	£	s.	d.
Soft foreign ppt.	21	10	0
English	23	0	0
Off. average, Aug.	23	6	7/11
Average spot, Aug.	23	2	4½

ZINC SHEETS, &c.

	£	s.	d.
Zinc sheets, English	36	0	0
Do. V.M. ex whf.	34	10	0
Rods	42	0	0
Boiler plates	34	0	0
Battery plates	33	10	0

ANTIMONY.

	£	s.	d.
Special brands, Eng.	64	15	0
Chinese	48	0	0
Crude	38	0	0

QUICKSILVER.

	£	s.	d.
Quicksilver	21	17	6

FERRO-ALLOYS AND STEEL-MAKING METALS.

Ferro-silicon—	
25%	£8 17 6
45/50%	£12 15 0
75%	£19 17 6
Ferro-vanadium—	
35/40%	£14/3 lb. va.
Ferro-molybdenum—	
70/75% c. free	5/- lb.
Ferro-titanium—	
23/25% carbonless	11½d.
Ferro-phosphorus, 20/25%	£17 15 0
Ferro-tungsten—	
80/85%, c. fr.	1/3½ lb.
Tungsten metal powder—	
98/99%	1/8½ lb.
Ferro-chrome	
2/4% car.	£33 15 0
4/6% car.	£23 15 0
6/8% car.	£22 17 6
8/10% car.	£22 10 0
Ferro-chrome—	
Max. 2% car.	£36 0 0
Max. 1% car.	£42 0 0
Max.0.70% car.	£54 0 0
70%, carbonless	1/4½ lb.
Nickel—99%, cubes or pellets	£170
Ferro-cobalt	9/3 lb.
Aluminium 98/99%	£105
Metallic chromium—	
96/98%	3/- lb.
Ferro-manganese (net)—	
76/80%, loose	£12 0 0
76/80%, packed	£13 0 0
76/80%, export	£11 15 0
Metallic manganese—	
94/96%, carbonless	1/10 lb.
Per ton unless otherwise stated.	

HIGH-SPEED TOOL STEEL.

Finished bars, 14% tungsten	s. d. 2 6
Finished bars, 18% tungsten	3 0
Per lb. net, d/d buyers' works.	
Extras—	
Rounds and squares 3 in. and over	4d. lb.
Rounds and squares under ¼ in. to ¼ in.	3d. lb.
Do., under ¼ in. to 5/16 in.	1/- lb.
Flats, ¼ in. × ¼ in. to under 1 in. × ⅜ in.	3d. lb.
Do. under ½ in. × ¼ in.	1/- lb.
Bevels of approved sizes and sections	6d. lb.
Bars cut to length	10% extra.
Scrap from high-speed tool steel—	
Scrap pieces	3d.
Turnings and swarf	1d.
Per lb. net, d/d steel makers' works.	

SCRAP.

South Wales—	£	s.	d.	£	s.	d.
Hvy. steel	2	17	6	to 3	0	0
Bundled steel & shrngs	2	10	0	to 2	15	0
Mixed iron & steel			2	12	6	
Heavy cast iron	2	17	6	to 3	0	0
Good machinery for foundries			3	0	0	
Cleveland—						
Heavy steel			2	15	0	
Steel turnings			2	5	0	
Cast iron borings			2	2	6	
Heavy forge			3	12	6	
Bushelled scrap			3	2	6	
Cast-iron scrap	3	1	0	to 3	5	0
Lancashire—						
Cast-iron scrap			3	5	0	
Hvy. wrought			3	2	6	
Steel turnings			2	2	6	
London — Merchants' buying prices delivered yard.						
Copper (clean)			48	0	0	
Brass (clean)			37	0	0	
Lead (less usual draft)			19	0	0	
Tea lead			16	6	0	
Zinc			16	6	0	
New aluminium cuttings			77	0	0	
Braziery copper			45	0	0	
Gunmetal			46	0	0	
Hollow pewter			170	0	0	
Shaped black pewter			130	0	0	

PIG-IRON

(f.o.t. unless otherwise stated).

N.E. Coast—	
Foundry No. 1	70/-
Foundry No. 3	67/6
Foundry No. 4	66/6
Forge No. 4	66/-
Hematite No. 1	75/6
Hematite M/Nos.	75/-
N.W. Coast—	
Hem. M/Nos. d/d Glas.	83/6
,, d/d Birm.	92/6
Midlands—	
Staffs. common*	—
,, No. 4 forge	60/-
,, No. 3 fdry.	65/-
Shrops. basic	—
,, Cold blast, ord.*	—
,, ,, roll iron*	—
* d/d Birmingham.	
Northants forge	54/-
,, fdry. No. 3	60/- to 61/-
Derbyshire forge	60/-
,, fdry. No. 3	65/-
,, basic	—
Scotland—	
Foundry No. 1	—
,, No. 3	74/-
Hem. M/Nos.	76/6
Sheffield (d/d district)—	
Derby forge	68/6
,, fdry. No. 3	70/6
Lincs. forge	—
,, fdry. No. 3	69/-
E.C. hematite	85/-
W.C. hematite	90/6
Lincs. (at furnaces)—	
Forge No. 4	
Foundry No. 3	—
Basic	—
Lancashire (d/d eq. Man.)—	
Derby forge	—
,, fdry. No. 3	73/-
Northants foundry No. 3	—
Dalzell, No. 3	105/- to 107/6
Summerlee, No. 3	92/- to 100/-
Glengarnock, No. 3	92/- to 100/-
Gartsherrie, No. 3	92/- to 100/-
Monkland, No. 3	92/- to 100/-
Coltness, No. 3	92/- to 100/-
Shotts, No. 3	92/- to 100/-

FINISHED IRON & STEEL.

Usual District deliveries for iron; delivered consumers' station for steel.

Iron—	£	s.	d.	£	s.	d.
Bars (cr.) nom.	9	15	0	to 10	15	0
Angles					—	
Tees to 3 united ins.					—	
Nut and bolt iron					—	
Hoops				14	10	0
Marked bars (Staffs.) f.o.t.				13	10	0
Gas strip				12	10	0
Bolts and nuts ¾ in. × 4 in.				15	5	0
Steel—						
Ship plates			8	2		
Boiler plts.			11	0	0	
Chequer plts.			10	5	0	
Angles			7	12	6	
Tees			8	12	6	
Joists			7	12	6	
Rounds and squares 3 in. to 5½ ins.			7	15	0	
Rounds under 3 in. to ¾ in. (Untested)			8	0	0	
and upwards						
Flats, over 5 in. wide and up			9	2	6	
Flats, 5in. to 1½in.			8	2	6	
Rails, heavy			8	2	6	
Fishplates			12	10	0	
Hoops (Staffs.)			10	10	0	
Black sheets, 24g.			10	7	6	
Galv. cor. shts, 24g.			14	0	0	
Galv. fencing wire 8g. plain			12	10	0	
Billets, soft	6	0	0	to 7	0	0
Billets, hard			8	2	6	
Sheet bars	5	12	6	to 5	15	0
Tin bars	5	12	6	to 5	15	0

PHOSPHOR BRONZE.

	Per lb.	basis.
Strip	1	2¼
Sheet to 10 w.g.	1	2¾
Wire	1	3½
Rods	1	2¼
Tubes	1	8
Castings	1	2

Delivery 3 cwt. free.
10% phos. cop. £40 above B.S.
15% phos. cop. £50 above B.S.
Phosphor tin (5%) £30 above price of English ingots.
C. CLIFFORD & SON, LIMITED.

NICKEL SILVER, &c.

	per lb.
Ingots for raising	9d. to 1/3
Rolled—	
To 9 in. wide	1/3 to 1/9
To 12 in. wide	1/3½ to 1/9½
To 15 in. wide	1/3½ to 1/9½
To 18 in. wide	1/4 to 1/10
To 21 in. wide	1/4½ to 1/10½
To 25 in. wide	1/5 to 1/11
Ingots for spoons and forks	9d. to 1/5½
Ingots rolled to spoon size	1/- to 1/8½
Wire round—	
3/0 to 10 G.	1/6½ to 2/1½

with extras according to gauge.

AMERICAN IRON & STEEL

At Pittsburgh unless otherwise stated.	Dols.
No. 2X foundry, Phila.	20.76
No. 2 foundry, Valley	17.50
No. 2 foundry, Birm.	17.25
Basic	20.00
Bessemer	19.96
Malleable	19.26
Grey forge	18.76
Ferro-mang. 80% d/d	90.00
Bess. rails, h'y, at mill	43.00
O.-h. rails, h'y at mill	43.00
Bess billets	33.00
O.-h. billets	33.00
O.-h. sheet bars	34.00
Wire rods	43.00
	Cents.
Iron bars, Phila.	2.12
Steel bars	1.80
Tank plates	1.80
Beams, etc.	1.80
Skelp, grooved steel	1.80
Skelp, sheared steel	1.80
Steel hoops	2.30
Sheets, black, No. 24	3.00
Sheets, galv., No. 24	3.85
Sheets, blue an'l'd, 9 & 10	2.25
Wire nails	2.55
Plain wire	2.40
Barbed wire, galv.	3.25
Tinplate, 100 lb. box	$5.50

COKE (at ovens).

Welsh foundry	—
,, furnace	—
Durham & North.	
,, foundry	—
,, furnace	14/- to 14/6
Other Districts, foundry	—
,, ,, furnace (basis)	12/-

TINPLATES.

f.o.b. Bristol Channel ports.

I.C. Cokes,	20×14, box	18/3
,,	28×20, ,,	36/6
,,	20×10, ,,	—
,,	18¾×14, ,,	—
C.W.	20×14, ,,	17/3
,,	28×20, ,,	—
,,	20×10, ,,	—
,,	18¾×14, ,,	—

Terneplates 28 × 20, — per box basis f.o.b.

SWEDISH IRON.

Bars, hammered	£18/10 to £19/0
Rolled Ord.	£15/0/0 to £15/10
Nail rods	£15 7 6 to £15 15 0
Keg. steel nom.	£33 to £35
Faggot steel nom.	£22 to £25
Blooms, according to quality	£8 to £12
Pig-iron	£5 15 0 to £6 0 0

all f.o.b. Gothenburg.

TUBES AND FITTINGS.

Up to and incl. 6 in.

	Tubes.	*Fittings*
Gas	67½%	45%
Water	63⅓%	40%
Steam	60%	35%

W.I. 10% extra.

DAILY FLUCTUATIONS.

Standard Copper (Cash).

	£	s.	d.		
Sept. 15	54	18	9	inc.	2/6
,, 16	55	1	3	,,	2/6
,, 19	55	5	0	,,	3/9
,, 20	54	15	0	dec.	10/-
,, 21	54	13	9	,,	1/3

Electrolytic Copper.

	£	s.	d.		
Sept. 15	62	5	0	inc.	10/-
,, 16	62	5	0	No change	
,, 19	62	5	0	,,	,,
,, 20	62	5	0	,,	,,
,, 21	62	5	0	,,	,,

Standard Tin (Cash).

	£	s.	d.		
Sept. 15	286	0	0	inc.	25/-
,, 16	285	5	0	dec.	15/-
,, 19	284	15	0	,,	10/-
,, 20	279	15	0	,,	100/-
,, 21	278	15	0	,,	20/-

Tin (English ingots).

	£	s.	d.		
Sept. 15	284	0	0	inc.	25/-
,, 16	283	10	0	dec.	10/-
,, 19	282	15	0	,,	15/-
,, 20	277	15	0	,,	100/-
,, 21	276	10	0	,,	25/-

Zinc Sheets (English).

	£	s.	d.		
Sept. 15	36	0	0	No change	
,, 16	36	0	0	,,	,,
,, 19	36	0	0	,,	,,
,, 20	36	0	0	,,	,,
,, 21	36	0	0	,,	,,

Spelter (ordinary).

	£	s.	d.		
Sept. 15	27	11	3	inc.	1/3
,, 16	27	12	6	,,	1/3
,, 19	27	10	0	dec.	2/6
,, 20	27	6	3	,,	3/9
,, 21	27	2	6	,,	3/9

Lead (English).

	£	s.	d.		
Sept. 15	23	5	0	inc.	5/-
,, 16	23	5	0	No change	
,, 19	23	10	0	inc.	5/-
,, 20	23	5	0	dec.	5/-
,, 21	23	0	0	,,	5/-

Exports of Iron Castings in August and the eight months 1927, compared with August and the eight months 1926.

	August, 1926.	August, 1927.	Eight months, 1926.	Eight months, 1927.	August, 1926.	August, 1927.	Eight months, 1926.	Eight months, 1927.
	Tons.	Tons.	Tons.	Tons.	£	£	£	£
BUILDERS' CASTINGS—								
Stoves, Grates, etc., Cisterns, Baths, etc., and cooking and washing boilers—								
To Argentine Republic	145	90	928	1,059	6,289	3,556	39,386	39,409
,, British South Africa	416	150	2,912	1,816	14,019	5,708	99,131	65,597
,, ,, East Indies	124	150	1,172	1,128	5,357	7,079	51,706	52,471
,, Australia	35	61	592	653	1,982	3,793	32,833	37,232
,, New Zealand	180	89	1,539	1,378	8,720	4,211	74,318	69,966
,, Other countries	645	478	5,327	4,829	31,734	23,941	253,834	244,564
Total	1,545	1,018	12,470	10,863	68,101	48,288	551,208	509,239
PIPES AND FITTINGS—CAST—								
To Argentine Republic	461	450	5,617	6,529	5,381	6,160	69,624	71,906
,, British South Africa	371	2,854	5,428	7,568	5,906	26,241	72,970	91,110
,, ,, India	318	554	6,050	4,714	4,433	9,248	76,318	74,372
,, Straits Settlements and Malay States	1,930	1,933	12,726	9,975	15,860	19,073	107,711	98,560
,, Ceylon	130	238	1,529	1,029	1,962	2,615	17,293	12,162
,, Australia	98	543	3,033	6,144	1,763	7,703	40,070	72,565
,, Other countries	3,064	5,924	33,370	40,410	47,548	72,400	460,258	531,550
Total	6,372	12,496	67,753	76,369	82,853	143,440	844,244	952,225
HOLLOW-WARE—								
Cast, not Enamelled, and Cast, Tinned	443	294	4,523	3,034	16,976	11,775	159,319	119,107
,, Enamelled	94	58	635	465	9,390	5,962	66,923	47,014
CASTINGS, in the rough—								
Iron	75	137	1,052	788	2,193	4,492	29,207	28,709
Steel	37	70	523	592	1,362	4,246	15,367	27,688

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18, BENNETTS HILL, BIRMINGHAM.
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FOWLERS BUILDINGS, BOMBAY.
CLIVE STREET, CALCUTTA.
20, SECOND LINE BEACH, MADRAS.
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1 SHAREH SONK EL TEWFIKIEH, CAIRO.

PIG IRON

SCOTCH, MIDDLESBRO', HEMATITE, BASIC, SPECIALS, &c.,

NON-FERROUS METALS

COPPER, TIN, LEAD, SPELTER, ANTIMONY, CHROME ORE

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ZETLAND ROAD MIDDLESBROUGH

SITUATIONS VACANT AND WANTED.

FOUNDRYMAN (21), five years' practical moulding experience, general engineering and jobbing, thorough metallurgical training in grey iron, analysis, metallography, etc., seeks progressive situation; first-class references; Matric. standard.—Box 426, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

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FOUNDRY MANAGER required for a Foundry situated in the South. Applications will only be considered from those possessing previous experience in a similar position in the rain water, soil, and general light castings trade, with intimate knowledge of costing and cupola practice.—Write, stating age, qualifications, experience, together with copies of testimonials or references, to Box 430, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOREMAN.—Iron Foundry, present output about 15 tons a week; must be used to controlling production of light automobile repetition castings to high standard of inspection, also general work; excellent opportunity for development for man who can get output with very low scrap on high quality work. Give full particulars, experience, results obtained, remuneration, etc.—Write Box 432, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

TENDERS.

CITY OF SHEFFIELD.

The Lighting Sub-Committee of the City Council is prepared to receive TENDERS for the Supply of LAMP PILLARS for the Lighting Department for the twelve months ending 30th September, 1928.

Particulars and Form of Tender, together with "Conditions of Contract," etc., may be obtained on and after Saturday, 24th September, 1927, on application to the Lighting Engineer, 42, Corporation Street, Sheffield.

Tenders to be enclosed in the official envelope provided, endorsed "Tender for Lamp Pillars," and delivered not later than Monday, 10th October, 1927.

The Committee do not bind themselves to accept any Tender.

Any person or firm sending in a Tender will be required to add a schedule to such Tender stating the names of the various classes of labour which he or they intend to employ, together with the places where such labour will be employed, and the rates of wages, hours of labour, and the conditions of employment to be paid and observed in respect of each class of labour, all of which, as shown in such schedule, shall comply with the City Council's form of clauses respecting wages, hours, and conditions of labour, and prohibition against assigning or sub-letting, a copy of which in the "Conditions of Contract" will be furnished with the Form of Tender.

J. F. COLQUHOUN,
Lighting Engineer.

Public Lighting Engineer's Office.
19th September, 1927.

PATENTS AND TRADE MARKS.

INFORMATION HANDBOOKS, Advice, and Cons. free; King's Patent Agency, Ltd.—B. T. KING, C.I.M.E. (Regd. Pat. Agent, G.B., U.S.A., and Can.), 146a, Queen Victoria Street, E.C.4. 40 years' refs. 'Phone: 0682 Central.

PROPERTY.

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THE VALUABLE AND EXTENSIVE WORKS, SITE AND BUILDINGS,
Formerly used by J. Crowley & Company, Limited,
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RAILWAY SIDINGS to L.M.S. and L.N.E. Rlys. Area about 11 acres, FREEHOLD. Works well situated and compact. Floor space about 145,000 sq. ft.

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SAND MIXERS.—New and second-hand. Ask us to quote. — W. BREALEY & COMPANY, LIMITED, Prospect Works, Hawksley Avenue, Sheffield.

MACHINERY, PLANT, &c., FOR SALE.

One HYDRAULIC ACCUMULATOR, 9¾-in. ram, 10-ft. stroke; 700 lbs. working pressure.

One HYDRAULIC ACCUMULATOR, 8-in. ram, 13-ft. stroke; mild steel riveted container, 9 ft. x 10 ft. high; working pressure, 1,500 lbs.; by the Hydraulic Engineering Company.

One HYDRAULIC PRESS, 9-in. ram, 12-in. stroke; 1 ft. 7 in. daylight; 21 in. high; by Hollings & Guest.

One HYDRAULIC INTENSIFIER, large ram, 8½ in.; small ram, 2½ in.; travel of ram, 12 in.; large ram, 1,500 lbs.; small ram, 9 tons per sq. in.

Horizontal DOUBLE GEARED STEAM WINCH (Roger), having a pair of cyls. 9 in. diam. x 14-in. stroke; foot brake; warping drums.

Several Ditto (Clarke, Chapman and Willson), each having pair of cylinders 7 in. diam. x 12-in. stroke.

Four "BLAKE" MULTITUBULAR BOILERS, each 12 ft. 6 in. high x 5 ft. diam.; reinsure 150 lbs. pressure.

VERTICAL COCHRAN LAND-TYPE BOILER, for gas firing, 16-ft. 3 in. high x 7 ft. 6 in. diam.; working pressure 80 lbs. per square inch.

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'Phone 98.

FOR SALE.—CUPOLA, new condition, No. 4 Jackman; capacity 6 to 7 tons per hour, with Blowing Equipment.—ASHMORE, BENSON, PEASE & CO., LTD., Stockton-on-Tees.

WANTED, Second-hand Band Saw for Foundry use; also small Tumbling Barrel.—TEMPLUS METAL CO., LTD., 16, Hazelville Road, London, N.19.

FOR SALE, latest type, 400 lb. capacity Oil-fired Monometer, Tilting Furnace.—Reply Box 428, Offices of THE FOUNDRY TRADE JOURNAL, 49, Wellington Street, Strand, London, W.C.2.

FOR SALE.—Sand-blast Apparatus, with belt-driven Compressor, complete.—Tenders to RECEIVER, Glancynon Foundry Co., Ltd., Aberdare.

'Phone: 287 SLOUGH.

TRY HAMMOND FIRST

NEW OIL SAND MIXER, latest type	..	£14
NEW ½ Ton LADLE (enclosed gear)	..	£14
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1 Ton DAVY STEEL CONVERTOR, with Motor and Tilting Gear		£120

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